DEPARTMENT OF ENERGY FISCAL YEAR 1984 BUDGET ON ENVIRONMENT PROGRAMS

HEARING

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

OF THE

COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-EIGHTH CONGRESS

FIRST SESSION

APRIL 19, 1983

[No. 58]

Printed for the use of the
Committee on Science and Technology

U.S. GOVERNMENT PRINTING OFFICE
28-185 O WASHINGTON : 1984

H761-31.

COMMITTEE ON SCIENCE AND TECHNOLOGY

DON FUQUA, Florida, *Chairman*

ROBERT A. ROE, New Jersey
GEORGE E. BROWN, JR., California
JAMES H. SCHEUER, New York
RICHARD L. OTTINGER, New York
TOM HARKIN, Iowa
MARILYN LLOYD, Tennessee
DOUG WALGREN, Pennsylvania
DAN GLICKMAN, Kansas
ALBERT GORE, JR., Tennessee
ROBERT A. YOUNG, Missouri
HAROLD L. VOLKMER, Missouri
BILL NELSON, Florida
STAN LUNDINE, New York
RALPH M. HALL, Texas
DAVE McCURDY, Oklahoma
MERVYN M. DYMALLY, California
PAUL SIMON, Illinois
NORMAN Y. MINETA, California
RICHARD J. DURBIN, Illinois
MICHAEL A. ANDREWS, Texas
BUDDY MacKAY, Florida
TIM VALENTINE, North Carolina
HARRY M. REID, Nevada
ROBERT G. TORRICELLI, New Jersey
FREDERICK C. BOUCHER, Virginia
LARRY WINN, JR., Kansas
MANUEL LUJAN, JR., New Mexico
ROBERT S. WALKER, Pennsylvania
WILLIAM CARNEY, New York
F. JAMES SENSENBRENNER, JR., Wisconsin
JUDD GREGG, New Hampshire
RAYMOND J. McGRATH, New York
JOE SKEEN, New Mexico
CLAUDINE SCHNEIDER, Rhode Island
BILL LOWERY, California
ROD CHANDLER, Washington
HERBERT H. BATEMAN, Virginia
SHERWOOD L. BOEHLERT, New York
ALFRED A. McCANDLESS, California
TOM LEWIS, Florida

J. H. POORE, *Executive Director*
ROBERT C. KETCHAM, *General Counsel*
REGINA A. DAVIS, *Administrator*
DAVID S. JEFFERY, *Minority Staff Director*

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

JAMES H. SCHEUER, New York, *Chairman*

TIM VALENTINE, North Carolina
TOM HARKIN, Iowa
MICHAEL A. ANDREWS, Texas
BUDDY MacKAY, Florida
ROBERT G. TORRICELLI, New Jersey
GEORGE E. BROWN, JR., California
RAYMOND J. McGRATH, New York
CLAUDINE SCHNEIDER, Rhode Island
ROD CHANDLER, Washington
TOM LEWIS, Florida

CONTENTS

WITNESSES

	Page
April 19, 1983:	
Dr. Alvin W. Trivelpiece, Director, Office of Energy Research, Department of Energy	23
Robert W. Davies, Deputy Assistant Secretary, Environment, Safety and Health, Department of Energy	40
Appendix—Questions and answers for the record	56

DEPARTMENT OF ENERGY FISCAL YEAR 1984 BUDGET ON ENVIRONMENT PROGRAMS

TUESDAY, APRIL 19, 1983

HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY,
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE
RESEARCH AND ENVIRONMENT,
Washington, D.C.

The subcommittee met, pursuant to notice, at 2:12 p.m., in room 2318, Rayburn House Office Building, Hon. James H. Scheuer (chairman of the subcommittee) presiding.

Present: Representatives Scheuer, McGrath, Schneider, MacKay, and Lewis.

Staff present: James Greene, science consultant; George Kopp, staff director; and Mary Beth McJury, minority technical consultant.

Mr. SCHEUER. The Subcommittee on Natural Resources, Agriculture Research and Environment will come to order.

Today's hearing is the second in a series designed to examine the Department of Energy's environmental budget request for fiscal year 1984.

In the first hearing, held on March 3, we heard testimony that the fiscal year 1984 budget request, if implemented, would lead to the elimination of several long-term projects in cancer research.

These projects are directed toward unlocking the secrets of the causes of cancer and ultimately could lead to cancer cures.

One witness stated that restoration of the budget to the 1982 level, an increase of 21 percent over the proposed budget, will not save the biology division at Oak Ridge National Laboratory.

Just to maintain the condensed staff we need an increase of 50 percent over the proposed 1984 budget.

The Department of Energy's authorization bill, passed in 1982, establishes the Agency's fiscal year 1984 funding level for the environmental programs at $300 million.

However, the administration has requested only $210 million for the same programs in fiscal year 1984.

Major cuts have occurred in nonnuclear health and environmental programs. Specifically, the 1984 budget proposal reduces research on cancer caused by fossil energy technologies, reduces studies of the genetic effects of energy technologies, terminates the program in health risk analysis and decreases research on the health effects of toxic chemicals.

While all of us up here applaud efforts to reduce unnecessary and duplicative efforts, many of these proposed cuts appear to be arbitrary, excessive and totally without merit.

This subcommittee has the responsibility to preserve the integrity of these environmental programs. The cuts imply either that we know everything that we have to know, or that we don't need to know what we think we need to know, or that somebody else will do it.

We do not have convictions that any of those three assumptions are true.

In today's hearing we look forward to hearing the administration's justification for the fiscal year 1984 budget.

The information provided by the witnesses will aid us in determining the appropriate level of funding for the Department of Energy's environmental programs.

My distinguished colleague from Rhode Island, Congresswoman Claudine Schneider.

Mrs. SCHNEIDER. Thank you, Mr. Chairman.

I'll keep my comment very brief. I would just like to welcome Dr. Trivelpiece and Dr. Edington. I look forward to your comments. I will emphasize my own personal belief, and I believe the belief of many of my colleagues, that we are in a state of frustration right now reviewing the recommendations that you have put forward. Many of us who serve on the Science and Technology Committee who have as a key priority research and development are very concerned, as the chairman said, as to where that lies as a priority with DOE insofar as the protection of human health.

The hearings that we have held have been rather unsettling, which indicate that there are numerous potentials for cancer and considerable linkages between the energy projects and human health. I'm looking forward to your testimony and your response to some of the questions related to that. Thank you very much.

[The prepared statement of Mr. McGrath follows:]

PREPARED STATEMENT OF RAYMOND J. MCGRATH

Thank you, Mr. Chairman.

I want to join you in welcoming our witnesses from the Department of Energy here today.

Human Health effects and environmental consequences from new and existing energy soures are concerns shared by the whole country. The goals of the biological and environmental research program are to identify, before a technology is locked into place, the early and late effects, if any, on human health and the environment.

In an era of rapid technological expansion, I think it is vital that these programs are adequately funded to assure the safety and health of the American people. I have serious concerns about some of the areas which are proposed for reduction. While reductions are necessary in order to contribute to reducing the deficit, it is very important that worthwhile programs continue to be funded while wasted and duplicate efforts are eliminated.

I look forward to receiving the Department's testimony on the fiscal year 1984 budget request.

Mr. SCHEUER. Thank you very much, Congresswoman Schneider.

Dr. Trivelpiece, your full statement will be printed in the record. Now, we would just invite you to chat with us informally. After that I'm sure we will have some questions.

[The prepared statement of Dr. Charles W. Edington follows:]

STATEMENT OF CHARLES W. EDINGTON
ASSOCIATE DIRECTOR
OFFICE OF HEALTH AND ENVIRONMENTAL RESEARCH
OFFICE OF ENERGY RESEARCH
DEPARTMENT OF ENERGY
BEFORE THE
SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE
RESEARCH AND ENVIRONMENT
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
APRIL 19, 1983

Mr. Chairman and Members of the Subcommittee: I am pleased to have this opportunity to discuss the FY 1984 budget request for the Biological and Environmental Research (BER) program supported by the Office of Health and Environmental Research (OHER). The BER program now includes the Life Sciences Research and Nuclear Medicine Applications programs formerly budgeted under the General Sciences and Research Appropriation. The merging of these programs recognizes the fact that there is a close interrelationship of fundamental research in the biological sciences with the various subprograms of BER and that both programs, as well as the Nuclear Medicine Applications research effort, are managed by the same technical staff. This change in budget and reporting categories in no way alters our interest in, or commitments to, the individual research components or the overall objectives of these programs.

There is widespread concern about potential human health effects and environmental consequences associated with new as well as existing energy sources. The Biological and Environmental Research program is the Department's program that addresses the health and environmental issues considered to be relevant to the expansion of existing energy technologies or development of alternative energy options.

The goals of this research program are to determine, at an early time, whether significant near-term or late biological or environmental effects are associated with the energy technologies in question. Answers to these questions, if obtained early enough, will make it possible for the Nation to meet its energy requirements with minimum damage to human health and the environment. In addition, decisions based on information gained through our program can avoid unnecessarily restrictive and cost-ineffective environmental regulations.

The Interagency Radiation Research Committee determined for FY 1982 that over two-thirds of the Federal research effort on health effects resulting from radiation exposure and essentially all of the Federal support for environmental studies of radioactivity was provided by the Biological and Environmental Research program ("Assessment of Radiation Research Strategy Implementation," NIH Publication in press). Additional radiation research is conducted in our laboratories with funds from other agencies. Comparable data for nonnuclear energy research are not available but, with the exception of acid rain and carbon dioxide issues, the interest and commitment of other agencies are modest.

The FY 1984 budget (Table 1) request for Biological and Environmental Research is $170.2 million. Of this amount, $161.5 million is for operating expenses, $7.7 million is for capital equipment, and $1.0 million is for construction. The level of funding requested in this budget will allow us to continue to obtain data needed for energy programs and policy decisions to ensure effective and environmentally acceptable use of the present and future energy options.

Table 1

Biological and Environmental Research
(B/A in Thousands)

	FY 1983	FY 1984
Operating Expenses	$174,243	$161,500
Capital Equipment	11,977	7,700
Construction	2,000	1,000
Total	$188,220	$170,200
Less Carbon Dioxide Research	9,000	12,000
Total OHER	$179,220	$158,200

To obtain the data needed to address energy-related health and environmental issues, a multidisciplinary research effort is needed. Therefore, the Biological and Environmental Research program is organized and managed in a disciplinary manner. Funding by various subprograms is presented in Table 2. This budget request includes the CO_2 subprogram which is budgeted in the BER program but managed under the multidisciplinary BES program. After enumerating some key highlights of the FY 1984 proposed research, each subprogram will be described in some depth.

28-185 O - 84 - 2

Table 2

Biological and Environmental Research
(BA in thousands)

	FY 1983	FY 1984
Human Health Research	$ 25,800	$ 24,429
Health Effects Research in Biological Systems	58,486	51,887
Environmental Research	25,565	22,595
Physical and Technological Research	29,292	25,989
Health and Environmental Risk Analysis	1,750	0
Nuclear Medicine Applications	21,000	21,000
Subtotal Operating Expenses	$161,893	$145,900
Capital Equipment	11,977	7,700
Construction	2,000	1,000
Program Direction	3,350	3,600
Total BER/OHER	$179,220	$158,200
Carbon Dioxide Research	9,000	12,000
Total Biological and Environmental Research	$188,220	$170,200

We will continue our research efforts to detect and measure the late biological effects resulting from exposure to low levels of radiation, effects which are still of major public concern. To obtain this information, support will be continued for long term investigations of a limited number of human populations that have been exposed to radiation. In addition, controlled experiments with animals and molecular and cellular systems will be supported to understand more fully the mechanisms controlling biological responses to low level exposures of neutrons, gamma rays and

internally deposited radionuclides. Support will also be provided to address the more generic and longer-term health and environmental issues associated with exposure to energy-related complex chemical mixtures or specific chemical compounds which have been identified as hazardous. The Cross Appalachian Tracer Experiment (CAPTEX) which uses stable tracer gases will be extended to follow diffusion of pollutants downwind for over 1000 km thus providing better information on the dispersion of pollutants and their effects, such as those associated with acid rain. Following up on recommendations of the National Academy of Sciences, a long term multidisciplinary ecosystem study in the energy-rich Arctic will be continued. Research using the newly available high intensity beams of x-rays and ultraviolet radiation at the Brookhaven National Synchrotron Light Source will provide the opportunity to define the structure of key cellular and molecular structures of living organisms with a speed and resolution not previously available. Finally, by taking advantage of recent advances in synthesizing boron containing tumor-specific compounds, the promise of effective use of neutrons for cancer therapy will be evaluated.

Human Health Research

The principal objective of the Human Health Research subprogram is to determine whether exposure of humans to agents associated with energy production and use results in health effects, such as cancers and genetic defects. Since these effects may not manifest themselves until years after exposure, long-term epidemiological studies of relatively large numbers of exposed and unexposed individuals must be followed to determine whether correlations between exposure to energy-related pollutants and disease incidences actually exist. Nearly two-thirds of this subprogram

budget is for long term epidemiological studies of over one million individuals who have been exposed to radiation. In these investigations funding is provided for support of investigations of the Japanese A-bomb survivors, and U.S. workers from nuclear shipyards, uranium mines, reactor operations and from the now defunct radium dial industry. The goal of this research is to obtain data on the radiation-induced somatic and genetic effects in humans who have been exposed to radiation from external sources as well as internally deposited radionuclides. These data will permit upper-bound estimates of the genetic risk and numerical estimates of the risk from such exposures.

Basic cellular and experimental animal studies have played an essential role in extending our knowledge of how radiation may affect human health, but the primary basis for risk estimates has nonetheless been data obtained from the AEC/ERDA/DOE studies of exposed human populations. The study of atomic bomb survivors in Japan has provided the best available estimates of the risk of various types of cancer resulting from exposure to gamma radiation from an external source. Although intensive study has been underway for over 30 years, the past decade has seen the identification of new potential cancer sites and revisions of previous estimates of risk.

Most recently, a reassessment of the radiation dose received by the A-bomb survivors in Japan has led to a major change in the role previously assigned to neutrons for production of cancer, and to a modest revision in estimates of gamma doses. Investigators in Japan and the U.S. are working together to refine the dose estimates for the A-bomb survivors. Whereas early dose estimates had indicated that the populations of the two cities must be studied separately because they were exposed to different

types of radiation (the mix of neutron and gamma radiation were thought to be different for the two cities), recent findings show that population exposures were not that different; therefore the two populations can be treated as one for purposes of analysis. This increases the sample size, thus providing greater statistical reliability. However, some health differences observed in the two cities, previously attributed to exposure to different types of radiation, will now have to be reassessed.

Although the study of bomb survivors has provided the predominant information used in developing a dose-response curve for radiation-induced cancer, it does have some inherent limitations, notably: the data were compiled from a single exposure at a high dose rate, and the samples are not large enough to detect the risk of very low dose rates with any confidence. As a result, studies of workers continuously exposed to very low levels of radiation over long periods of time were begun by AEC as early as 1964. The initial studies of DOE and DOE contractor employees have subsequently been expanded to include naval shipyard workers and serviceman present at nuclear weapons tests in Nevada. The results to date have not contradicted the low-risk estimates that have been based on the dose-response curves resulting from the Japanese studies.

An important epidemiological study of radium-dial painters subjected to radiation from internal radium deposits has provided data that is the primary basis for setting all standards for radium and other incorporated radionuclides such as plutonium. Epidemiological research on the effects of chronic exposure to internally deposited plutonium is now being conducted on plutonium workers at several DOE facilities; preliminary results

obtained in this work support the maintenance of current standards for these alpha emitters.

Although the Japanese population being studied is relatively large and the doses to which the parents were exposed were relatively high, a series of investigations to detect genetic effects among the offspring of atomic bomb survivors have provided no evidence for transmission of such effects from irradiated parent(s) to unexposed offspring. Thus, we continue to place heavy reliance upon genetic data obtained with experimental animals, primarily the mouse, for estimates of the genetic effects to be anticipated from human radiation exposure. It is important to point out, however, that the genetic studies in Japan have provided an exceedingly valuable assurance that the use of animal data does not seriously underestimate the effect on human populations.

For FY 1984, priority will continue to be given to defining more precisely the late biological effects of acute and chronic exposures to radiation and radionuclides through studies on radiation workers, Japanese A-bomb survivors and other relevant populations. Although the major emphasis of this subprogram has been on health effects from radiation exposure, in recent years the human health research subprogram also funded small scale research efforts on populations of individuals who have been exposed to chemicals from nonnuclear energy technology sources and conservation options. These studies will be continued.

Health Effects Research in Biological Systems

Human health risks should be estimated from data obtained in studies of human responses to toxic agents. However, for legal and ethical reasons, prospective experiments using toxic agents are seldom done on humans. Therefore,

existing human data are rarely adequate to make reliable health-risk estimates. Human epidemiological data must be supplemented with information from studies of animals and other living systems. Research in this subprogram is providing toxic agent response data which can be used to quantify dose-response relationships in experimental animal systems. In addition, experimental animals, as well as molecular and cellular systems, are being used to study mechanisms by which toxicants induce health effects and to evaluate the many variables (e.g., level, rate and route of exposure) that may affect the ways in which humans respond to harmful environmental agents.

This applied and basic research program is broad and multidisciplinary in scope and often requires unique experimental facilities. Its objective is to identify potentially toxic physical and chemical agents associated with energy technologies and to determine, in experimental systems, the effects produced, if any, following exposure to these agents. Emphasis is placed on determining the delayed biological effects that are induced by long-term exposures to low concentrations of toxic agents. Three categories of health effects are investigated: cancer, genetic damage, and toxicity to functional systems of the body.

In the radiation area, research continues to develop quantitative information on the cancer risks associated with exposures to low-doses of radiation from external radiation sources and from radionuclides deposited in body tissues. Of major importance are a series of ongoing lifetime studies with dogs exposed by inhalation, ingestion or injection to plutonium, other transuranic elements and long-lived fission products. In such

research, careful work on metabolism and internal distribution of radionuclides is required to determine the radiation dose delivered to critical organs so that one may relate the organ dose to level of cancer produced. Dose-response models developed from such studies are needed for assessment of health impacts associated with the continued development of nuclear energy technology and with defense program needs.

Since there is no data base available on the biological effects produced in humans following exposure to neutrons, research is being conducted at several DOE laboratories to investigate mechanisms of cancer induction by neutron irradiation in experimental animals and in mammalian cell systems. Recent data obtained at the Argonne National Laboratory has demonstrated that repeated low doses of neutrons produce more tumors and more cell transformations than occur when the equivalent total neutron dose is delivered over a short period of time. This response contrasts sharply with results obtained following exposure to small fractions of X or gamma radiation. Fractionation of X or gamma ray exposures reduces the magnitude of the radiation effect, indicating that repair of molecular damage occurs under such exposure conditions. Because of the importance of such data, emphasis in 1984 will be placed on obtaining more quantitative information and data relating to the mechanisms involved in this enhanced neutron effect.

Our research also addresses health issues related to the production and use of America's vast fossil reserves. The products, byproducts, emissions and process streams of synthetic fuel processes contain thousands of chemical compounds whose health effects are unknown. Some results obtained in recent short-term research in this area have shown that (1) relatively

few compounds out of the thousands contained in synfuel related complex mixtures cause mutation or cancer of the skin; (2) compounds demonstrated to be highly mutagenic in the Ames test are not the most carcinogenic when skin cancer is studied; (3) these mixtures contain chemicals which are initiators of cancer (i.e., compounds which alter DNA) as well as compounds which are promoters of cancer (i.e., compounds which do not produce tumors themselves but enhance the production of malignant tumors in initiated cells); and (4) the same biologically active chemicals are found in all biologically active synfuel mixtures regardless of their source of origin.

As a result of knowledge gained from these experiments we can now focus our longer-term research efforts on fewer, more generic questions. It is our intent to conduct research on (1) the mutagenic and late biological effects produced by representative energy-related chemicals about which little or nothing is known; (2) the fundamental mechanisms involved in initiation, promotion and inhibition of cancer expression; and (3) the toxic effects produced by these complex mixtures.

Fundamental biological research provides the knowledge base upon which the more applied biological and environmental program depends. Research in biophysics, genetics and cell biology provides valuable information on the structure, function, and interrelationships of the fundamental components of complex living organisms. Knowledge of these components under normal conditions is vital to (1) understanding how energy-related agents affect living cells and organs; (2) identifying early indicators of biological damage; and (3) defining the risks to human health from toxic agents. For example, the three dimensional structure of normal DNA (the

28-185 O - 84 - 3

genetic material of the cell), protein molecules and other cell components can be determined by using X-ray and neutron diffraction techniques. Similar techniques allow us to observe the structural changes produced in these materials by pollutants that lead to cell death, mutations and cancer.

Recent advances in molecular biology, in which recombinant DNA and gene transfer techniques are being used, are also providing exciting new ways to define the cellular basis for the development or expression of cancer. For example, by using such techniques to introduce a specific genetic modification in a mammalian cell system it is possible to manipulate the expression of cancer causing genes, oncogenes, and observe differences in cancer development by exposing the cells to varying levels of specific chemical compounds which control oncogene expression.

For FY 1984, research will be conducted to define delayed biological effects induced in mammalian systems by low-dose radiation from internally deposited radionuclides and from external radiation sources. Emphasis will be placed on completing long term, late effect studies with dogs, expanding research on the genetic effects of neutron irradiation and developing new approaches to study mechanisms of radiation-induced damage. Similar research on energy-related chemical toxicants will also be conducted. Emphasis will be on generic research to elucidate metabolic pathways of energy-related chemical carcinogens (activation and detoxification), their mechanisms of tumor initiation and promotion, and how exposure to combinations of chemical agents influences their effect. Long-term studies with experimental animals to define and quantify cancer risks from specific energy-related chemical agents will also be maintained. Basic molecular and cellular research will continue to use powerful new biophysical and

genetic research tools as probes to improve insights into the structure, properties, and functions of cell proteins, nucleic acids, and other cell constituents that are targets of both physical and chemical pollutant action.

Environmental Research

The goal of the environmental research program is to obtain information on mechanisms which control and influence total ecosystems and the critical elements within them. With such information appropriate siting and disposal of materials from energy systems can be made that are both cost effective and environmentally safe. To obtain this information base, an interdisciplinary research program in terrestrial and aquatic systems is conducted in different climatic regions and in offshore regions along the East and West coasts of the United States. The objectives of the program are to (1) identify processes involved in the transport, transformation and fate of energy-related materials in the environment; (2) determine effects of energy technologies on critical ecosystems and the resiliency of the ecosystem in adapting to continued impacts; and (3) identify processes used by plants and animals in degrading and detoxifying energy-related pollutants in the environment.

In this subprogram, the transport and uptake of inorganic and organic compounds, as well as radionuclides, are monitored as these substances move and change form through water bodies, soils, and sediments. The availability of these materials to plants and animals is determined. Studies are conducted on plant uptake through roots and leaves to understand how such pollutants are incorporated into the food chain. Research to understand the cycling of contaminants is coupled to studies on cycling

of nutrients normally required by an ecosystem. Such studies provide important information needed to develop scientifically sound measures for control of energy-related materials. For example, where a radioelement behaves like a plant and animal nutrient, it may be concentrated in certain food chains and pose a potential hazard to humans. Recent research results indicate that technetium behaves like sulfur: it accumulates in plants, in fowl, and, ultimately, in eggs consumed by humans.

Research in the marine environment includes work on (1) transport processes, (2) sediment and water interactions of natural materials and contaminants by physical and biological mechanisms, and (3) uptake of these materials in the food chain. This research has recently yielded important data which indicate that over half the annual production of plant microorganisms off the Northeast coast is transported across the shelf to the upper continental slope. Many energy-derived particles and others of human origin are also carried along. As a result, conditions are created whereby dissolved metals and radionuclides are removed from the water column and are collected in the bottom sediments. In FY 1984, research will continue to determine the rate at which these materials are removed from the near coastal zone, as well as their ultimate fate offshore.

To understand how natural populations withstand normal stresses as well as stresses induced by energy-related activity, investigations on biological responses of ecosystems are carried out on communities of plants and animals, populations of single species, and on single cells of plants and animals. Basic research of this type, for example, was used recently to develop master maps showing different sensitivities of environmental units in the Arctic. Based on information from these maps, user groups can predict the ability of each landscape unit to handle stresses resulting

from increased vehicle traffic, oil spills, or construction and avoid ecologically sensitive areas.

Another research program is concerned with metabolic processes by which organisms in the environment accumulate or eliminate metals, and the threshold beyond which the organisms can no longer function. From this research, it will be possible to predict more accurately the concentration of metals to which aquatic animals can be safety exposed. In a related area, research on plant metabolism shows that under laboratory conditions, too much sulfur dioxide (e.g., 200 ppb) reduces the ability of plants to fix carbon dioxide by as much as 30 percent. This is an important finding since the buildup of sulfur dioxide in the air, already thought to be a factor in acid rain, may affect the rate at which carbon dioxide is accumulating in the atmosphere. We will continue to fund research to understand metabolic processes which accumulate or eliminate metals in plants and animals in the coming fiscal year.

Long term safe storage and disposal of contaminants from the extraction, refining, or combustion of fuels is a pressing problem, particularly in energy-rich regions of the country. An expansion of this basic program on cycling of materials in terrestial systems will be made in FY 1984. It will focus on movement and fate of chemicals dissolved by water percolating through the ground, including the role of vegetation for sequestering possible contaminants in the leachates.

Physical and Technological Research

This subprogram constitutes the physical sciences component of the health and environmental research program. It ranges from fundamental research into the physical mechanisms that underlie radiation and chemical

interactions in biological systems to applied analytical chemistry studies which define the chemical species that are responsible for observed biological activity. This subprogram also includes our atmospheric science research which is striving to improve our capability for describing the transport and transformation of energy-related materials in the atmosphere. Finally, our measurement sciences program is developing advanced instrumentation techniques for health protection, materials characterization, and biomedical research purposes.

A key activity in this subprogram over the past few years has been to characterize chemically a variety of synfuels-related materials in order to determine which specific chemicals are responsible for producing biological effects in simple test systems. The conclusion of this research is that the same types of chemicals are responsible for biological activity found in coal derived syncrudes and boiler fuels as well as gasifier tars. This is a significant finding since there was no a priori reason to assume that the biological effects of syncrudes, boiler fuels and coal tars would be caused by the same classes of chemical agents, particularly since the materials are produced by three different processes. With this knowledge, we feel confident in redirecting our research program to address long-term generic issues relevant to all coal conversion technologies.

Research on acid deposition in this and other agencies has produced the first comprehensive description of the distribution of major chemical species over the North American Continent. These descriptions, which are in map form, display seasonal concentrations of calcium, ammonium, nitrate, sulfate, and hydrogen ion and show greatest deposition in the Ohio, Pennsylvania, West Virginia region. In addition, a series of

models has been developed which starts with source term data, a grid of power plant emissions throughout a region, and predicts spatial and temporal concentrations of various chemicals. Using source term data provided by EPA emissions information and ambient levels of these chemicals from other network measurements, these models now need to be tested to evaluate their capability and determine their limitations. In addition, we are initiating a field research effort which is specifically designed to investigate the dry deposition process which is thought to contribute upwards of 50 percent of the total acidic deposition in various areas.

Another atmospheric science initiative involves the study of long-range transport. Many regional air pollution models have been developed in the last few years, but, until recently there has been no way to verify them. The development of a series of non-reacting non-depositing gases, the perfluorocarbons, which can be detected down to 2 parts in 10^{15} parts of air, now enables verification of model transport predictions over areas as large as the Northeastern United States. The first full field experiments will take place later this summer when 6 releases of these tracers from Western Ohio and possibly Central Ontario will be measured at about 100 surface locations in the Northeastern United States and Southern Canada. Aircraft will also be used to measure the tracer gases in the atmosphere. Since the tracer released from either of the two locations will travel over the Appalachian mountains, the experiment is called the Cross-Appalachian Tracer Experiment-1983 (CAPTEX-83).

Sponsoring CAPTEX-83 along with the Department of Energy are the National Oceanic and Atmospheric Administration, the Environmental Protection

Agency, the Electric Power Research Institute, the Atmospheric Environment Service of Canada and the Provinces of Ontario and Quebec.

The measurement and dosimetry activity in this subprogram is concerned with developing improved radiation and chemical instrumentation systems as well as better techniques for assessing human exposure to energy-related agents. A new method for uranium analysis, based on laser excitation, provides improved sensitivity and precision yet requires less preparation time, smaller sample amounts, and costs less. This method is currently being used to measure uranium worker exposure. Prototype development of a new technique termed supercritical fluid chromatography/mass spectrometry shows great promise for the rapid analysis and identification of many kinds of the biologically active substances. Further, optimization of the system is expected to produce a technique which will have a major impact on analysis for a broad range of biological and environmental applications.

In FY 1984, we expect to complete our current chemical analysis research in conjunction with short-term biological studies and redirect this activity along with the biological effects research effort toward longer term generic research. Major emphasis in our atmospheric research program will be CAPTEX 83 for which we anticipate initial data analysis to be completed some six months after the large field experiment. Our measurement science program will give particular emphasis to development of health protection instrumentation and techniques. With the Radiological Accelerator Facility at Columbia University now operational, an enhanced effort in low-level radiation biology and dosimetry will be undertaken.

Nuclear Medicine Applications

Nuclear Medicine is the branch of medicine concerned with the use of radioactive and stable isotopes in biomedical research and clinical medicine. The Department of Energy in accordance with the Atomic Energy Act of 1954 as amended (P.L. 83-703) supports research in nuclear medicine by bringing together physicists, chemists, biologists, engineers and physicians to develop medically useful isotopes, isotope-labeled pharmaceuticals and instrumentation to the level where they are clinically validated. Thereafter, these new technologies, instruments, and isotopic materials are transferred to the private sector for manufacture and distribution, or made available to other agencies and institutions for use in the study of specific diseases. The nuclear techniques which have been developed in this subprogram for diagnostic purposes has changed the practice of medicine. They have reduced the need for invasive procedures and exploratory surgery, made hospital stays shorter, less painful and dangerous, and have greatly expanded the physician's arsenal in his fight against disease and suffering.

Recently there has been considerable research emphasis on the production and use of short-lived radionuclides. The isotopes are medically useful because they decrease the dose of radiation to the patient. Other aspects are also important. For example, a collaborative effort between Oak Ridge National Laboratory and the Children's Hospital in Boston is nearing the completion of an Osmium-191/Iridium-191m generator. Iridium-191m has a half-life of only 4.96 seconds. This is a valuable characteristic because it provides practically no radiation to the patient and can be used to repeat and validate studies rapidly. Of even more importance is the fact that there now may be a good non-invasive way to

28-185 O - 84 - 4

accurately diagnose suspected congenital heart problems in tiny infants and children.

Concurrent with the development of short-lived radionuclides has been the growth of Positron Emission Tomography (PET), a body imaging technique. It provides the unprecedented capability to examine and measure the local biochemical and physiologic changes of the human body. The combination of computer based tomographic techniques and positron-labeled natural chemicals permit PET to be used as a safe, non-invasive biochemical microscope.

Research in the nuclear medicine area is also being conducted to develop neutron capture therapy for potential use in medicine. This type of treatment requires the incorporation of compounds labeled with boron into the tumor, and subsequent irradiation with neutrons. The boron atoms capture the neutrons, and in so doing, emit alpha particles which are extremely effective in killing nearby cancer cells. Thus, the radiation dose is almost completely concentrated in the tumor, producing little or no damage to surrounding healthy tissue. Recent developments in both boron chemistry and in our ability to develop cancer-seeking compounds have revived community interest in this treatment modality. These and other applications of radioactivity to medical practice and technology will continue to be studied in the FY 1984 budget year.

Carbon Dioxide Research

The Carbon Dioxide Research program is designed to develop a sound, quantitative atmospheric carbon dioxide knowledge base to aid in energy policy decision making. This program is designed to improve our understanding of the fundamental scientific relationships between CO_2 concentration

and climate; this will be accomplished by increased data collection, improved measurements, and development of reliable models. With such data, questions about the relationships between future atmospheric levels of carbon dioxide, the magnitude of climate change and the responses of crops and ecosystems to higher CO_2 levels can then be answered with confidence.

The FY 1984 budget request of $12.0 million will allow for additional programmatic efforts in collecting and analyzing data on the effects of increased CO_2 levels on crops such as corn and wheat, expanding our research efforts on the first detection of CO_2 induced climate change, increasing research on carbon uptake in oceans, and participating in an international cloud climatology program that should significantly improve climate models. Notice that while funds for this CO_2 program are budgeted in the Biological and Environmental Research Program, the Office of Basic Energy Sciences manages the CO_2 program.

Mr. Chairman, that concludes my testimony. I will be pleased to respond to any question which you and the committee may wish to ask.

STATEMENT BY DR. ALVIN W. TRIVELPIECE, DIRECTOR, OFFICE OF ENERGY RESEARCH, DEPARTMENT OF ENERGY

Dr. TRIVELPIECE. Mr. Chairman, I don't have a prepared statement for the record. The prepared statement is under Dr. Edington's delivery. I just wanted to make some introductory remarks.

The creation of the Atomic Energy Commission in 1947 was accompanied by some rather interesting law. That law in effect stipulated that the Atomic Energy Commission should take the necessary steps in order to determine what the benefits of nuclear energy would be; and try to promote those, and to determine what risks might be associated with it, and to protect people from them. That's to some extent a defensive strategy and an offensive strategy. I think those were important things to do. In DOE that role was expanded to include other kinds of energy in addition to nuclear radiation. We know a great deal about radiation and what it does, but we don't know as much about what chemicals do to the human species, animal species and other things.

The ERDA act of 1974 extended the same type of offensive/defensive strategy into the chemical arena as well. That was carried over into DOE and now DOE has the responsibility for these programs. The programs are important to the Department. You asked, why is it then that the Department has made cuts in these programs. It's been a matter of priorities at the margin. There isn't

anything wrong with the programs, not as far as I'm concerned. I'm not a biologist so, to some extent, having some responsibility for these programs has put an unusual requirement on me to learn more about them.

This last year I made a personal visit to six laboratories and examined their programs in some detail. I think the biological and environmental research program is a remarkable collection of programs. It does include studies along the lines you were talking about. We're not making a point of cutting these programs because there is anything particularly wrong with them. It is a question of priorities of the other activities within the Department.

In addition, this last year I commissioned a study to look into the accomplishments of the Office of Health and Environmental Research. You may not recall, but last year during this hearing I pointed out that there were some benefits that accrued in the ordinary sense of return to the Federal Treasury from sales that resulted from various nuclear medicine activities. These included things like the diagnosis of specific diseases such as diseases of the thyroid gland. Sodium iodide detectors are used to measure whether thyroid glands are hyperactive or hypoactive. Such techniques are used to carry out research on the thyroid gland and also to provide a benefit to the patient from using iodide 131. These nuclear medicine activities amount to a very substantial industry in the United States. In fact it's estimated that there are something like 70 million nuclear medicine applications that are applied to 40 million patients in the United States each year. By whatever arithmetic you would care to use, you come up with a rather staggering sales that's associated with that. That sales carries with it some tax return which goes back to the Federal Treasury. Therefore, without even getting into the issue of whether or not this has reduced human suffering or extended life or protected the people, it has been a very good investment for the United States to make in the ordinary investment sense that you are doing this for corporate reasons. Well, having made those statements last year and having done so on the basis of only some elementary calculations and estimates, on my part, I thought it would be a good idea to have a little bit more solid base on that kind of a study.

There is a draft report that is called OHER Research Accomplishments. That draft report should be completed in the near future. If the record for this hearing is still open, I would like to have that report submitted for the record, because it does document some of the benefits that have accrued to the United States and to the public as the result of programs that were managed under this biological and environmental research program that started with the AEC, carried into ERDA, and is now continued in DOE.

You should not conclude from the reductions in the budgets that we're proposing, that there is concern with the quality of the program, but rather that there is a need to balance priorities within the overall budget limits which the Department faces.

If there are no questions of me at this time I would like to turn to Dr. Edington and have him talk about the contents—the technical contents of the program.

Mr. SCHEUER. I didn't get the drift of what you were saying there. We have great concern up here. One witness, this morning, talked about my phraseology of cutting—this was in connection with EPA—he corrected me and said they're gutting the EPA research budget.

We don't understand why you're cutting the research budget and eliminating these programs that hopefully would lead to vast improvements in the way we propose to control carcinogenic substances. We fail to understand how, at a time when we're desperately trying to shift from Persian Gulf oil—shift our dependence on Persian Gulf oil—and begin to use 500 years of coal that we have underneath the surface of our land, and where we need to know desperately how to use that coal in ways that are not degrading to our environment and to our national health. We can't for the life of us understand why you're reducing your budget for energy research. We can't understand why, with all the tremendous national anxiety here and in Canada about acid rain and the absolute moral outrage of the Canadians directed at our country at their perception of our total insensitivity, lack of sensitivity to their concern and our failure to keep commitments that our President made to them, we cannot understand why you're cutting your research into the causes and the effects of acid rain and how we control it and what a reasonable level of regulation would be. We cannot understand why it is necessary for the Environment Defense Fund to join forces with the Chemical Manufacturers Association of America to force EPA to do the research that you and EPA should be doing together. Research to figure out how we can enable our smokestack industries, in the Ohio River Valley and elsewhere, to keep on producing but not decimate our forest, our streams, our rivers, our lakes, our croplands, our grasslands, our building structures all over the country. We are absolutely astonished at the apparent insensitivity of this administration in creating the database that we need intelligently and cost effectively to cope with the problems of acid raid. Industry itself has to sue our Government to do the research that industry needs to have in order to engage in prudent investments in programs and processes.

There is great dismay around here, and I must say it's on a bipartisan basis. Maybe you can shed some light in view of the urgent national need for energy research, the need to do something constructive about acid rain. The need to do something constructive to bring our smokestack industry into some kind of consistency with our national health and environment. In view of the need to make this transfer from fossil—from coal and gas—from oil and gas to coal, which we have in abundance, but which we honestly don't know how to use without degrading our health and environment, how can you sit there so apparently complacent and say, "Well, it's just a question of priorities." The American people consider their priorities their health and their environment. We view these reductions, these slashes in energy research to be utterly destructive of any hope to achieve a light at the end of the tunnel.

I wish you could tell us something more compelling than what you've told us so far.

Dr. TRIVELPIECE. I don't have anything more compelling, but I think we share the common goal and, as you stated, the need to

correctly understand and ascertain the risks associated with a variety of things that have the potential for causing insult in the environment or to human health related activities. It's a question of do we have an adequate program and what are we doing within the budget constraints within which we're living.

I think that we do have a balanced program and we're trying, as best we can, to propose a program that will accomplish precisely what you're talking about. The acid rain issue, I believe, the budget in fact for that has not been cut.

Mr. SCHEUER. That's quite correct. That's the one budget that hasn't been cut.

Dr. TRIVELPIECE. The CO2 budget was increased this year. There were some adjustments within the programs budget, that's absolutely correct. I have been around and looked at the various programs at the laboratories and whereas I understand why those that came in and testified before you earlier might make a plea for special projects at particular laboratories, nevertheless, we have the responsibility, as you earlier stated, to see to it that there is not duplication or other overlap of efforts.

There's no disagreement—I want to make that clear—on the objective. We have the same objective that you do. Whether it is $10 or $20 million, more or less, at the margin and what would be done with that, we could talk about the activities that that would add to or subtract from the program. In and of themselves, that slight difference in these budgets is not likely to either put the United States at a tremendous disadvantage, nor give it an unusual advantage. There's nothing wrong with the activities. I think the activities should be done. We did propose a budget which was within the overall constraints that we had to live with.

Mr. SCHEUER. Mr. McGrath?

Mr. MCGRATH. Thank you, Mr. Chairman. I ask for unanimous consent to have my opening statement in the record immediately after the chairman's.

It is alleged that there is a $56 million difference totally in the R&D DOE budget from the 1982 appropriation to the 1984 request. A 21-percent reduction.

As I look at this it doesn't look like anything has been zeroed out. The Department is still handling the same responsibilities as it had in the past; am I correct?

Dr. TRIVELPIECE. One program was zeroed out. Health and environmental risk analysis.

Mr. MCGRATH. Risk assessment. Why?

Dr. TRIVELPIECE. We sought to protect the experimental activities as we were making these reductions. That's an evaluative activity that follows on from the experimental programs.

Mr. MCGRATH. I feel that all of the R&D that's being done, either by you or EPA or somebody, has little or no value unless there is a risk assessment done as to what are the relative risks between the results of some R&D as opposed to some other risks, and I believe that's the direction we ought to be going in.

Dr. TRIVELPIECE. I agree. The question is on whom is it incumbent to carry out that part of the study, whether it's the lab scientists or it is those who would use this information.

Mr. MCGRATH. And in your assessment is that——

Dr. TRIVELPIECE. We made the choice.

Mr. MCGRATH. And your assessment is that somebody else should be providing it.

Let me get into the issue of R&D vis-a-vis standards. We heard testimony this morning from those in the water business and the solid waste disposal business, and others. They testified there are no standards that come out of R&D, as a result there's no statutory provision for which the Government can sue for compliance or anything else. How do you feel about that? Do you think there ought to be as a result of R&D certain standards met as to parts per billion of dioxin or whatever? Do you feel that that's reasonable for scientists like yourselves to come up with some sort of number that we can legislate?

Dr. TRIVELPIECE. As you posed it, I think I have to be in favor of it. It is clear, however, that zero risk is not an acceptable proposition. There is always a gray scale, and it is within the gray scale that most of the debate takes place. There is a level of chemical insult above which it would be clear that no one would be willing to take the risk, and there is a level below which probably you couldn't detect anything. How do you determine in between those two limits where to put it in a commonsense way that doesn't distort the national economy or cause other kinds of disruptions. That leads to some lively debate. At that point scientists are not all that useful. They're capable of trying to define the distribution function over which it goes from being riskless to absolute fatality. It is incumbent on somebody else to decide the cost benefit risk assessment——

Mr. MCGRATH. Who's better prepared to do that? You certainly wouldn't want us to do that, would you?

Dr. TRIVELPIECE. Given the input from scientists, given the input from economists, and various political elements, yes, I think you probably are in a better position to do it than anyone else. But that means a balanced input from all the individuals who should be making input to such considerations.

Mr. MCGRATH. If your main thrust—main objective—is the health and safety of the people you represent, should some of those other inputs be as heavy an input as those of yourself, or the people who will conduct this research?

Dr. TRIVELPIECE. That's a difficult value judgment issue. It's do you take polio vaccine or not. It's very clear that some people die as a result of taking it, and yet it is clear that millions are alive because of it. Where do you draw the line? If you insisted that it be absolutely safe you would never use the vaccine. There are countless examples that are similar to that. There isn't any particular scientific discipline that gives you any clear guidance on how to balance the risk.

Mr. MCGRATH. Let me give you an example that comes to mind that I have to live with every day.

That is the risk of dumping your garbage as opposed to incinerating your garbage. Unfortunately, we're not going to eliminate garbage. Sanitary landfills are one way of handling it. Incinerating through resource recovery plants is another way of handling it. Unfortunately, the determination as to what kind of disposal is available is left to a local government that has no knowledge of

your activities or even the product of your activities. Its enforcement of the environmental laws is left to the States and local jurisdictions also. We seem to get off the hook, frankly, by producing R&D that leads nowhere. It doesn't give the local authority anything or the State authority anything that they can sink their teeth into and say above this standard is something which is risky to the health of the people of my district on Long Island, as opposed to burning the garbage in a resource recovery plant where there are four parts per billion particulate of dioxin being emitted. That's the kind of thing that I think that research and development ought to be aiming toward. To give local governments and State governments some kind of handle as to how they are best able to dispose of their problem. That is not what I see coming out of just pure R&D.

I just thought maybe you would like to react to something like that.

Dr. TRIVELPIECE. Certainly, the level of understanding that would be capable of providing the national guidelines that you're talking about would be a great boon to the country. I couldn't agree more. The question is how you come about an accurate determination. What constitutes an absolute risk? I don't see any particular way by which to do that in the manner that you're seeking an answer.

Mr. MCGRATH. Well, let's put it this way. When we do R&D for building codes or fire codes somewhere along the line some of that information, the results, are translated into improvements in the building code or the fire code. Something that local government can adopt. Seemingly, that's just not the case in environmental research and development.

Dr. TRIVELPIECE. But you could adopt building codes which would lead to costs for building construction that would make it prohibitive to ever build a building.

Mr. MCGRATH. That's absolutely true.

Dr. TRIVELPIECE. And you could do the same thing very easily with requirements for health and safety considerations involving toxic chemicals or radiation.

Mr. MCGRATH. I agree with that too.

The point is that there are no guidelines, no standards, no anything being given. All it is is raw research and scares the hell, frankly, out of the people in the Nation.

Dr. TRIVELPIECE. The research is, in fact, probably capable of providing some benefit. Part of the problem is that research also does something else which produces some mischief. This includes things like single ion resonance spectroscopy which permits you to measure the presence of a single atom in the mixture of a collection of other atoms. It could be used as a standard against which you would say we will have no more of this in a room than that which we can measure. You could measure it to an incredibly low level. Unfortunately, in some cases the standards have been applied based on the capability of the technology to make measurements of small quantities of material independent of whether or not there is any demonstration that that level or quantity of material has any relationship to realistic risks. That's an unfortunate element.

Mr. MCGRATH. I'll give you an example of that. We have a resource recovery plant operating, it was not operating at its opti-

mum level, but when your Agency or EPA, I should say, did a stack examination it came out with four parts per billion of dioxin and the place closed down. It's been closed for 3 years. Now, what is the risks of four parts per billion of dioxin emitted into the air as opposed to lighting a cigarette. Nobody puts it in that kind of context and as a result, a $100 million plant has been closed down for 3 years. Nobody in EPA, nobody in DOE, and I frankly don't know the relationship on this particular plant, but certainly DOE has some role in the operation of these plants, somehow. Nobody is saying to the local government that has to get rid of maybe 20,000 tons of garbage a day—they're not telling them how to get rid of it, first, and second, they're precluding by one test one avenue of relief.

Dr. TRIVELPIECE. I agree with you and I think we're making the same point. That is that it takes a combination of legislation, understanding of the research risks, and regulatory activities in order to come up with a realistic cost-benefit cost-assessment of the circumstances you're talking about. The scientists play only a limited role in that. To some extent lawmakers have to play a role in that to see to it that the kind of situation that you described doesn't occur, because that's one that's based on an ability to make a measurement at that level, not on whether or not that constitutes an absolute or unacceptable or a cost-effective benefit that could be posed by establishing that level of four parts per billion.

Mr. MCGRATH. There was a request this morning that a national blue ribbon panel for standards of dioxin be established. What would your reaction to that be?

Dr. TRIVELPIECE. I'm not aware of it. It seems like a good idea.

Mr. MCGRATH. OK. Of the difference between the fiscal year 1982 appropriation—let me ask you this first. What was your request as opposed to what you are submitting here, what was your Department request for?

Dr. TRIVELPIECE. $205 million.

Mr. MCGRATH. You asked for $205 million and the administration asked for $210 million?

Dr. TRIVELPIECE. No, $170 million.

Mr. MCGRATH. Excuse me.

Dr. TRIVELPIECE. The Department includes in the budget, which you must have before you, the Office of Environmental Protection in addition to biology and environmental research.

Mr. MCGRATH. All right.

The total would be $210 million between both; $40 million for Environmental Safety and Health; $170,200 for Biological and Environmental Research. Now, you are telling me that you asked for $205 million?

Dr. TRIVELPIECE. Yes. The original departmental request was for $205 million.

Mr. MCGRATH. Where did they take that out? Where did they take that $35 million out of your request?

Dr. TRIVELPIECE. I don't have the details.

Mr. MCGRATH. Human Health Research is approximately $24.5 million. Health Effects, Biology, approximately $52 million. Environmental Research approximately $22.5 million. Physical and

Technical Research $26 million. If you had to add back $25 million, where would you do it?

Dr. TRIVELPIECE. It's always an interesting question. You understand that as the administration representative I'm not permitted to answer the question in precisely the manner you drew it.

Mr. MCGRATH. I'm asking you if I were being generous and I told you that you had $25 million more to spend, where would you put it? Would you add it back to Risk Analysis from the $4 million appropriation you had?

Dr. TRIVELPIECE. I don't have the schedule before me and I don't recall the priorities that we backed out as we reduced the budget. But obviously to a first approximation we would add it back in the manner in which it was reduced between the $205 million and the $170 million obviously, time has gone by since that particular point. If funds were added back into the program, we would certainly like to have the opportunity to reexamine them in light of the present research opportunities, and determine what would be done as distinct from simply a direct readdition. The priorities were as we thought they were then and not much has changed since then.

Mr. MCGRATH. Obviously your priorities are in the area of nuclear medicine where you asked for an increase of 17 percent. I understand that.

In the area of program direction, another increase of 26 percent. In every other category you were reduced by between 5 and 75 percent. In fact you were reduced in one, 100 percent—Risk Analysis. In the construction budget you've asked for a reduction of 75 percent of what you had last year, I understand. What I'm asking you is, if you had your way for another $20 to $25 million where would you put it?

Dr. TRIVELPIECE. That's what I was trying to get across.

Mr. MCGRATH. I understand. I'm asking the question a different way this time.

Dr. TRIVELPIECE. I just don't remember the rank and order in which—perhaps Dr. Edington does—but when we went through the budgets earlier within the Department, there were items that were removed on a priority basis. I've simply forgotten.

Mr. MCGRATH. Let's put it this way.

What are some activities under your budget that you want to have nothing to do with and you just want out?

Dr. TRIVELPIECE. The Health and Environmental Risk Assessment program was one that we zeroed out and I think given the need to protect some of the experimental programs I would continue to leave it at zero.

Mrs. SCHNEIDER. Would the gentleman yield so that I might ask why?

Mr. MCGRATH. We just went through that drill, but go ahead.

Dr. TRIVELPIECE. That to some extent is the responsibility of EPA. We're doing the experimental and the theoretical part and the biology and the consequences of various chemical risks. That is what they do physically and biologically to the systems, how you interpret that and what types of regulations should be imposed as a result of it is more of EPA's responsibility than it is ours.

Mrs. SCHNEIDER. So would you support the idea of EPA's budget in this area being increased as much as it is being zeroed out here?

Dr. TRIVELPIECE. I don't see why not.

Mrs. SCHNEIDER. OK.

Mr. MCGRATH. I guess what she's trying to say is that this is an important function and no matter whose hide it comes out of, it should be there someplace.

Dr. TRIVELPIECE. It's an interpretative function that follows from the research.

Mr. MCGRATH. I have no further questions, Mr. Chairman.

Mr. SCHEUER. Congresswoman Schneider?

Mrs. SCHNEIDER. I wonder if you could elaborate on the 23-percent cut in toxic metal studies?

Dr. EDINGTON. I'm not aware that we specifically cut toxic metal studies by 23 percent.

Mrs. SCHNEIDER. There are cuts there. There are also cuts in R&D to identify the various toxics. You are aware of that, I'm sure.

Dr. EDINGTON. These are research activities that are associated with fossil energy related materials which we have reduced, in order to concentrate our research activities on more generic, longer term research in the cancers—carcinogenic—and organ toxicity areas, so they would be included.

Mrs. SCHNEIDER. OK. Then how about the Health Effects Biology where you're cutting basic biological studies? That is being cut 23 percent.

Dr. EDINGTON. It's being reduced in this area and those areas are basically looking at the structure and the function of key biological materials, but more to the point they are reducing our activities in looking at the mechanisms that are involved in the translation of the damage to cancer.

Mrs. SCHNEIDER. The mechanisms meaning——

Dr. EDINGTON. But we're not reducing them to zero.

Mrs. SCHNEIDER. No, that is true, thank heavens, but these are substantial reductions I daresay.

Overall, cutting the cancer studies, you're cutting that by 5 percent. That also relates to what you just said. That you're concerned with the long-term health effects. What is this 5 percent that is being cut?

Dr. EDINGTON. It's basically a reduction, probably across the board both in the radiation effects area as well as the nonnuclear area. What we are trying to do, as a result of our short-term biological studies that have been conducted in the past 4 or 5 years, is to now concentrate our research activities on the more generic, longer term carcinogenic activities. For example, we know that in cellular systems, in bacteria, human and mammalian cells, that certain fossil energy related chemicals or complex mixtures of chemicals do indeed produce mutation and also produce skin tumors, when painted on mice. We now are concerned about those specific chemicals being introduced into a whole organism of a mouse, a rat, or a hamster over a long period of time at low doses, to determine whether or not indeed cancer is induced after a long chronic exposure period.

Mrs. SCHNEIDER. So you are attempting through research and development to identify the various chemicals?

Dr. EDINGTON. We have identified the chemicals that are potential carcinogens and mutigens now, as a result of our studies in the fossil energy area. Now we want to see if they do indeed produce a late biological effect.

Mrs. SCHNEIDER. And as I see under the category of Physical and Technical Research, there is also a 28 percent cut in R&D to identify the chemicals.

Dr. EDINGTON. Yes, ma'am. Again, the characterization of the physical or chemical nature of complex mixtures that come out of fossil energy plants, we have very well researched. I don't think there is any purpose in expending large amounts of money in that area, at this time. More importantly is to measure those materials, if we have the techniques to do so, and if not to develop the measurement systems to allow us to determine what's coming out of the stacks, if it's a stack, or the product, if it happens to be in a synthetic fuel process. But, I think, the important issue is, we now need to turn our attention to the more biological activities, as opposed to the physical/chemical characterization of those chemicals related to nonnuclear activities.

Mrs. SCHNEIDER. I have no further questions. Thank you, Mr. Chairman.

Mr. MACKAY. Mr. Chairman, I apologize for having gotten here late. I am not certain whether the questions that I have are questions which have been covered. If they have, I hope you will pardon my asking you to duplicate testimony you've already given.

I thought I saw on the front of the written testimony a very good summary of what your responsibility is, to address the concern about potential human health effects and environmental consequences associated with new as well as existing energy sources. That seems to me to summarize that very well. I've tried to take that concept and look at your budget. It seems to me you have a great deal of concern about the—in the area of nuclear safety and not much concern in the area of coal and others. It seems to me that nuclear is a minor percentage of our overall energy mix, at this point. Coal and the fossil fuels certainly are a major part and it seems to me that just looking at that you are not adequately reflecting the overall energy picture in this country, but rather a point of view that we better get the nuclear questions resolved and not worry about the others. I'd like your comment on that.

Dr. EDINGTON. Well, I would have to take you back a few years, Mr. MacKay. I think it's very important to remember that the nuclear or radiation effects research activities that are supported by this program are basically in the human epidemiological area. Studying those populations who have received significant exposures, either as a result of the atomic bombs in Hiroshima and Nagasaki, or in the occupational workplace in DOE facilities or DOE contractor facilities, as well as in the naval shipyards. Those are unique populations. There are populations of people who have been exposed and who will live out a finite life, and it's very important to determine whether or not there are any late biological effects, such as cancer or transmittable effects, that would be passed on to their children. Therefore, we support approximately 17 million dollars' worth of epidemiological studies on exposed humans. In addition, we're the only organization in the Federal Government

who have long-term late biological effects studies using experimental animals. In this case the experimental animal was chosen back in the 1950's to be the dog, which was more nearly like man, from the standpoint of lungs and other organ systems. As a consequence, those dog studies may last for 17 years and we're trying to relate the effects of plutonium exposure and other transuranic products from the weapons program or from nuclear energy on the production of cancer or genetic effects.

Those are essentially mortgages that we have on the only studies in the world in that context. I would like to point out that in the Federal Government this program supports over 70 percent of all the radiation effects research. All of that research, for the most part, is long-term human or experimental animal studies.

We still feel a commitment to the nonnuclear activities. Unfortunately, in the nonnuclear area, today, we're about where we were in the 1940's with the radiation effects program. We're having to try to identify what is biologically hazardous—that is the individual chemical compounds or mixtures of chemicals that do produce an effect. As a consequence, we have essentially expended a large amount of money in short-term studies trying to relate the products of gasification, or liquification, of coal combustion to the chemicals that are produced or released to the environment in those materials. Consequently, now that we have identified the bad actors, we are beginning to put them into long-term studies, which are essentially similar to those studies that we now support and have supported for a long time in the radiation area.

I think we're just not at the point that we can pour large amounts of money into long-term studies in the fossil energy related support area, at this particular time. We don't know much about it, but we're trying to get that in a logical, systematic, rational way.

Mr. MACKAY. I understand what you're saying. It just seems to me that perhaps my view of it, which is coming on this cold, is a fairly typical view and it's difficult to avoid the conclusion that you're shifting priorities away from studies that have been underway. At a time when the production of new chemicals is probably expanding, you seem to be shifting into a lower priority mode.

Dr. EDINGTON. I think that we shouldn't look at it as looking at a large number of new chemicals. We're really looking at a complex mixture of chemicals, which we have already fractionated and isolated a specific small number of chemicals that are related to fossil energy synthetic fuels activities, which are bad actors. We know what those classes of compounds are. They are not large in number. But they are relatively potent mutagens and carcinogens. Consequently, we now need to know whether injected into, or inhaled, or fed to experimental animals they produce an effect—as a later effect—in this case a tumor or organ dysfunction, or a mutation. Once we have that information we can relate that to exposure doses and then, hopefully, extrapolate down into the lower exposure regions and have some basis for setting standards on specific chemicals, not on complex mixtures of chemicals.

Mr. MACKAY. I have no further questions, Mr. Chairman.

Mr. SCHEUER. We've seen the long-term budget for biological and environmental research cut from $212 million in 1982 to $170 mil-

lion in 1984. Is there any long-range plan for the program that explains why these cuts were made? You've done it to some extent, or you've tried. Have you reduced this to writing that we could study? I just find it very difficult to comprehend, why you're making this enormous slash from $212 to $170 million in these ongoing programs. Do you have any plan for long-term environment research?

Dr. TRIVELPIECE. Let me give this a try.

This program as it was originally put in the AEC, moved into ERDA, moved into DOE, and has been managed in a variety of different places within the Department. It has not had consistent long-term management guidance. The Department itself has changed character a little bit in the change of the administration.

Mr. SCHEUER. Are you going to cut the program further when it comes to your 1985 budget? Is this just another element in a series of cuts, the graph is pointed down and it's going to continue to go down? Will you come in for $135 million for 1985, down from $170 million? What's your long-term planning?

Dr. TRIVELPIECE. Since we haven't done our spring planning projections, I really can't say what will be the Department's budget for next year. From my own part I don't intend to start the process with a reduced budget.

Mr. SCHEUER. Since many of these programs you're talking about are long term, don't, reductions in effect eliminate these programs?

Dr. TRIVELPIECE. Stability and continuity are absolutely essential for long-term research programs. I would like to see stable long-term commitment to these programs. What I was trying to get at is that the movement from one place to another, within the Department, has not worked to these programs' advantage.

This hasn't worked to the programs' advantage to have the character of the Department change and so on. These programs were only moved into the Office of Energy Research a couple of years ago. Last year I took Dr. Fredrickson and Dr. Ral, who are distinguished scientists in this area, had them accompany me, we went on a field trip to laboratories and talked about all these programs. I commissioned a study which was to look at the Office of Health and Environmental Research programs with respect to past accomplishments. I plan to conduct a review of the program this year in order to try to help define what constitutes the right kind of a base program, what should be the long-term commitment to it, and then make recommendations to the Department through the budget planning process.

Mr. SCHEUER. Do you have such a study that lays that out?

Dr. TRIVELPIECE. It is in the process of being put together right now.

Mr. SCHEUER. If it's in the process of being put together but isn't finished, how can you come in here on an ad hoc basis and cut from $200 million and whatever to $170 million? Isn't that jumping the gun?

If you're going to come in here for a rational plan for these substantial cuts in research, don't you think you owe it to yourselves and owe it to us to give us the benefit of your long-term thinking?

Dr. TRIVELPIECE. Yes, I would agree.

Mr. SCHEUER. When is the plan going to be ready?

Dr. TRIVELPIECE. I would hope some elements of it would be completed by the end of summer or the middle of fall.

Mr. SCHEUER. I don't understand this. I absolutely find this incomprehensible. You're coming in with a major cut in these research programs, and you tell us you have a long-term plan but the long-term plan isn't finished yet.

Dr. TRIVELPIECE. No, I didn't say we have a long-term plan. I said we're in the process of preparing one.

Mr. SCHEUER. Don't you think it might have been more appropriate to have had a long-term plan and then make cuts, if they have to be, that are consistent with some kind of rational approach to your ongoing research?

Dr. TRIVELPIECE. Yes, sir.

Mr. SCHEUER. I find your approach this morning, with all respect, Dr. Trivelpiece, totally unprofessional and unbusinesslike. It defies my imagination as to how professional people can act in this way. It's hard to ask you rational questions. You're going to have a plan to make—to set up a long-term program for research. In the meantime you come in with these radical cuts, absent a long-term plan. How can you expect a congressional committee of people who are trying their best, without deep backgrounds in scientific matters, how can you expect us to make any sense out of this?

Dr. TRIVELPIECE. The departmental request was $205 million. That was a plan which we thought was appropriate. We are dealing within a constrained budgetary circumstance. It was necessary to make adjustments according to guidance that we were given.

Mr. SCHEUER. Where did this come from? Where did this so-called guidance come from?

Dr. TRIVELPIECE. Guidance is part of the administration's process of developing a budget.

Mr. SCHEUER. Did it come from OMB? Did it come from the White House? Did it come from DOE?

Dr. TRIVELPIECE. It includes OMB, yes.

Mr. SCHEUER. And they told you you had to go down from $205 million to $170 million?

Dr. TRIVELPIECE. They gave the Department overall budget guidance, and it was necessary within the Department to meet this and this was the compromise and balance that was made. It's not simply this program, there're other programs that are involved.

Mr. SCHEUER. We're concerned with this program this afternoon.

I'm not Speaker, I'm not even majority leader, I'm just the little subcommittee chairman.

Dr. TRIVELPIECE. I'm trying to make a case for the best possible program that we could put together within the $170 million that the administration is requesting.

Mr. SCHEUER. It just could be that that $170 million limitation is unwise and perhaps bordering on the irresponsible. Is that not a possibility inasmuch as you don't have any benchmarks by which to judge it? You haven't completed your program yet. You'll have your program in 6 months.

Dr. TRIVELPIECE. Or less.

Mr. SCHEUER. Or less.

I find it impossible to give you rational questions. The irrationality of your whole process frustrates any considered congressional scrutiny. It defies my imagination.

Congressman Lewis?

Mr. LEWIS. Sorry, Mr. Chairman.

Mr. SCHEUER. We're delighted to have you.

Congressman Tom Lewis, one of our most diligent and thoughtful freshmen members.

Mr. LEWIS. Would you, Dr. Edington, comment on the $3 million cut in basic research for the moleculars, cellular, and development biology, as well as the postponed establishment of a center for structural biology at Brookhaven?

Dr. EDINGTON. We will reduce the budget in the area of molecular and cellular level studies. We will continue to do the studies at Brookhaven on the use of the HFBR, the high flux beam reactor, and on the National Synchrotron Light Source, to look at the structure and function of specific biological materials. We wanted to establish a center which made all of the facilities at Brookhaven—the scanning transmission electron microscope, the National Synchrotron Light Source, and the HFBR available to users from around the country. We, in fiscal year 1984, will postpone that. We do not intend to wipe it off the slate.

Mr. LEWIS. What is your reason for wanting to postpone it? Don't you think it's just as necessary today as it would be in 1985?

Dr. EDINGTON. I think that the influx of dollars that would be required to establish it as a center would simply not be available, and we did not want to essentially wipe out other important research activities in those areas.

Mr. LEWIS. The funding for research in Health Effects Biology has been reduced from $64 million to $58 million for 1983 and to $51 million for 1984. How have these cuts affected the carcinogenic research? Cancer today is the heaviest killer along with heart disease that we have. Why would we want to reduce the cost of this research?

Dr. EDINGTON. I don't think that those specific cuts would necessarily affect the carcinogenic studies in the experimental animal that we are conducting. Most of those cuts would come from the short-term bioassay activities that were conducted to identify the chemicals that are indeed biologically hazardous. In the case of fossil energy, for example, and in the case of synthetic fuels, for example, the liquid product of coal conversion is a mix of very complex mixtures of organic chemicals—a large number—maybe thousands. We have isolated from that complex mixture, in short-term bioassay systems, the biologically active chemicals. We are now turning to experimental animal studies, not short-term studies but long-term studies, in which we will allow the animal to inhale aerosols of the complex mixture, or be injected with those complex mixtures to determine whether or not now in a whole organism—a mouse or rat—cancers are produced over the long term as a result of varying exposure levels. We would be stopping one type of research that is related to cancer and starting a new type of research which is also related to cancer.

Mr. LEWIS. I guess I have trouble understanding why you would want to stop one at all.

Maybe you could elaborate on that.

Dr. EDINGTON. A short-term test is simply a very rapid, inexpensive, cellular test. It can be conducted with bacteria which you expose to determine whether or not a chemical or complex mixture of chemicals produces a mutation in that bacteria. It may cost you $500, $750, or $1,000 for a single test. To take that same chemical or mixture of chemicals and put it into a mouse, over the lifetime of that mouse or over a longer period of time and observe the mouse for a lifetime, it may cost you $4 or $500,000. In the short-term test we were able to screen out those compounds that were not active so we don't waste money putting them into a whole animal system. We only test those chemicals that are indeed demonstrating biological activity. In the case of benzepyrene, for example, it's a potent mutagen, it's a potent carcinogen. It's found in that complex mixture from synthetic fuel production. There are many other chemicals that we know very little about, we don't know whether they are active or not active—or we didn't know—now we do. It turns out that in the production of shale oil, the production of liquid materials from coal conversion, and in the tars from coal gasification, we're finding the same chemical compounds with the same biological activity and we no longer have to do the biological—the short term bioassay—and chemical fractionation tests. We can now identify the chemical we want to study in a whole animal. So we stopped the short term tests in the same way that we did this in the 1940's with radiation.

Mr. LEWIS. What's the status of the research on human responses to toxic agents?

Dr. EDINGTON. In the case of chemicals, I know of very little information that is available on exposure of human populations to chemicals. In the radiation area we have a considerable amount of information on the effects in humans, who have been exposed to relatively high doses, and a lot of information in experimental animals. In the case of toxic chemicals the data is just not available.

Mr. LEWIS. I notice that you have reduced by 28 percent your request for R&D to identify toxics.

Dr. EDINGTON. To identify toxics?

Mr. LEWIS. Yes. That's on Physics and Tech Research.

Dr. EDINGTON. Yes.

Mr. LEWIS. You're cutting R&D by 25 percent to identify the toxics.

Dr. EDINGTON. That is a situation in which the physical and technological studies provide the characterization—the chemical and the physical characterization—of those complex mixtures that I was telling you about. Those characterizations were tied very closely to bioassay studies, which are short term. When you stop the biological assay—the short-term biological assays—you no longer have to do the chemical fractionation or isolation necessary to study those materials.

Mr. LEWIS. Why is the department delaying chronic toxicity studies of energy-related chemicals?

Dr. EDINGTON. Why is it cutting that?

Mr. LEWIS. No, why is it delaying the study on chronic toxicity of energy-related chemicals?

Dr. EDINGTON. I'm sorry, sir. Did you say delay?

Mr. LEWIS. Delaying. It's my understanding you're delaying your studies on chronic toxicity studies of energy-related chemicals.

Dr. EDINGTON. I don't think that is correct, sir. I think that we are reducing our support for short-term bioassay, but we are now beginning to do the long-term generic studies with those chemicals that have been identified as biologically active.

Mr. LEWIS. Are you satisfied, overall, with the budget reductions that are being proposed, that you are going to be able to provide the necessary R&D and studies and the accelerated answers necessary for the protection of the public?

Dr. EDINGTON. Mr. Congressman, I'm a manager of a research program. No research manager is ever satisfied with his budget, I don't think, regardless of how much it is. I think that we have a viable research program under this budget.

Mr. LEWIS. You're willing to stake your reputation on that? On the answer you just gave me.

Dr. EDINGTON. The first or second one?

Mr. LEWIS. The last answer. Not the first one. I understand the first one.

Dr. EDINGTON. Yes, sir.

Mr. LEWIS. Thank you, Mr. Chairman.

Mr. SCHEUER. We appreciate your patience in putting up with these questions. We want to thank you for your effort to answer them. In the nature of this process, the answers that you have given us have not been helpful. You have failed to justify any one of these cuts. You know, we are not experts. Tom Lewis and I are businessmen. I'm also a lawyer.

Mr. LEWIS. I'm an engineer.

Mr. SCHEUER. So you're an engineer. I stand corrected. He's an engineer so he has some scientific and technical background that I do not have. You see, we're sort of generalists and you come up here with a budget and under this process if you want to increase your budget you tell us why. If you want to decrease your budget, on an item-by-item basis, you tell us why. All you've told us is that some guy upstairs told you you're going to have to go from $210 million to $170 million. You did the best you could. That's not an answer that we find acceptable, very frankly.

Maybe you should go back to the drawing board and tell us what you think the environmental and health needs of the American people require, in the way of an ongoing research program at DOE. Maybe you'll have that in your plan that you're going to produce in the months to come. If you produce a plan that makes sense I'll be the first one to apologize. My apology may take the form of regret that we didn't have that plan at the time we had the hearing, and that we had no compelling justification for these serious cuts.

Well, I guess we all have done the best with what little we may have had to work with.

We thank you for your testimony and for your patience.

I'll ask our next witness, Mr. Robert Davies, to come to the witness table.

Mr. Robert W. Davies, Deputy Assistant Secretary, Environment, Safety and Health.

Your prepared testimony will be included in full in the record.

Why don't you briefly summarize and feel free to comment on anything you've heard this afternoon.

Tell us what are the underlying, intellectual, underpinnings of these budget cuts. You've been sitting here for, I guess, a few minutes. You may have heard concern expressed by all of the members here, cutting across both parties.

We are very concerned that these cuts—the American people are concerned, they think the government has let them down. By government, that includes you. That includes Tom Lewis. It includes Jim Scheuer from New York.

Did you see the movie "Network"?

Mr. DAVIES. No, sir.

Mr. SCHEUER. Well, this is a family-type show and I can't quite exactly paraphrase it. At one point in the movie, this guy who is really fed up to his gills, throws open the window and sticks his head out the window and he says, "I'm sick and tired of all this stuff and I'm not going to take any of this guff anymore," only he didn't say guff. I've cleaned up the copy a little bit. I think the American people are very much aroused in the last few months at what they perceive to be threats to their health and their environment and their kids and their grandchildren. The government isn't coping with it. They don't distinguish between the executive branch and the legislative branch. They just think government—executive, legislative, judiciary, Federal, State, and local—it's all one big mish-mash to them. Government is letting them down and threatening their health.

What can you do to assure us that these drastic cuts that you have recommended are consistent with your mission of protecting—of achieving the knowledge that we need to accrue to protect the health and the environment of the American people? And are consistent with our need to establish a regulatory framework that on a no-nonsense basis establishes limits to the degree to which industry can pollute our health and environment. We don't want to hurt business. We don't want them to suffer an extra burden. We want them to compete in global trade. We want a vigorous, competitive, national industry. We don't want our smokestack industries polluting the skies, damaging our trees, our forest and our grasslands. We don't want them polluting our croplands, our rivers, our streams, our lakes. We don't want the chemical companies polluting our waters or our land or air. We've heard witness after witness after witness, from State and local governments, complain that we don't have the knowledge base we need to legislate or for you folks to set standards. Maybe you can explain to us why the Chemical Manufacturers Association had to join with the Environment Defense Fund in suing the EPA—that sort of means you, not exactly—suing the executive branch to force them to do the research that they thought had to be done before they could function effectively. Before the chemical manufacturers could function effectively. They didn't want to build new plants in the dark. They didn't want to have to make billions of dollars of capital investments in the dark without any guidelines as to what was safe and what wasn't safe. These are some of the questions we hope you'll answer.

We are expressing concern and it's not just coming from us. It's coming from the people we represent. We are very responsive and sensitive people as to the needs and concerns and anxieties of our constituents or we wouldn't be here, but we are here and we're reflecting their concerns.

STATEMENT OF ROBERT W. DAVIES, DEPUTY ASSISTANT SECRETARY, ENVIRONMENT, SAFETY AND HEALTH, DEPARTMENT OF ENERGY

Mr. DAVIES. Mr. Chairman and committee members, I'm sitting here almost as a citizen in response to what you've just said. I have to agree that your concerns are certainly valid and well placed. Sitting here though as the Deputy Assistant Secretary for Environment, Safety and Health, I'm a little confused as to how I should respond. My particular responsibility is related primarily to the environmental, safety and health of the operations of the Department of Energy. In other words, my perspective is more inward looking than outward looking.

[The prepared statement of Mr. Davies follows:]

Statement of Robert W. Davies
Deputy Assistant Secretary
Environment, Safety and Health
Department of Energy
Before the
Committee on Science and Technology
Subcommittee on Natural Resources, Agriculture Research and Environment
April 19, 1983

Mr. Chairman and members of the Subcommittee, I am pleased to be here today to discuss with you the Department's budget request for FY 1984 for the Environment, Safety and Health Program.

GOALS AND STRATEGY

The Environment, Safety and Health Program (ES&H) provides an independent overview and assessment of the Department's management of contractor-operated facilities to assure safe and healthful workplace conditions, the safety and health of the public, protection of the environment, and compliance with applicable ES&H-related statutory and regulatory requirements in the Department's facilities and operations. The program also assures that energy issues compatible with national energy goals are considered in the development of proposed environmental requirements.

Achieving the Department's environmental, safety and health protection and quality assurance objectives hinges on a solid partnership between the Environment, Safety, and Health Program and the Department's line programs. The ES&H Program furnishes the line programs with applicable ES&H requirements through general policy orders, monitors their efforts in complying with these requirements, and assists with technical advice in resolving implementation problems. This allows the line programs, which have the principal responsibility for safety, to proceed with greater assurance that they will not incur interruptions from accidents, public controversy, or litigation stemming from non-compliance with ES&H-related laws or sound ES&H practices.

PRINCIPAL AUTHORITIES

The principal statutes which authorize the ES&H Program are the DOE Organization Act which establishes, as an organizational purpose, a Departmental goal of protecting and enhancing environmental quality and assuring public health and safety; and the Atomic Energy Act which exempts DOE and its contractors from licensing and regulation but requires the Department's operations to be conducted in accordance with comparable health and safety practices. In addition, the National Environmental Policy Act requires consideration of environmental factors in agency decisionmaking which often results in the preparation of environmental assessments and environmental impact statements.

2

ORGANIZATION

The Environment, Safety and Health Program is organized and carried out by five major components: Nuclear Safety, Quality Assurance and Standards, Operational Safety, Environmental Compliance and Environmental Analysis. Their activities involve the development of policies and standards; oversight to monitor program and field office performance in complying with DOE policies and standards; technical and policy guidance assistance, as needed, to foster compliance; the review of National Environmental Policy Act documents, and the analysis of energy/environmental issues. The principal focus of the ES&H Program has been recently sharpened to emphasize more strongly than ever safety, health protection and quality assurance in the Department of Energy's nuclear operations. We have found that there are safety lessons learned after the Three Mile Island incident that could be applied to the operation of DOE nuclear facilities.

This program is essential to the continued effective operations of the programs of the Department of Energy.

FY 1983 ACCOMPLISHMENTS

During the FY 1983 we anticipate our accomplishments to include:

- The conduct of the first comprehensive environmental protection, safety and health protection appraisal of four Departmental Field Operations. The comprehensive appraisals consist of performing appraisals in approximately ten functional areas in conjunction with, and as a contribution to, a management appraisal of the organization being assessed.

- The development of guidance to define the scope and content of fundamental training for operators of DOE reactors.

- The providing of technical expertise and assistance to field offices and line safety organizations in the review of safety analyses, and interpretation and guidance on Departmental policy for environmental protection, safety, and health protection for nuclear facilities and operations.

- The start of expansion of Atmospheric Release Advisory Capability (ARAC) to cover all DOE nuclear facilities, and continued coordination with Department of Defense for application of ARAC to nuclear weapons sites in the United States. Attained a 30 minute ARAC response to emergencies at DOE and military sites.

- The completion of fire protection surveys at five DOE installations and completion of guidelines for optimum fire management systems.

- The completion of a baseline quality assurance overview of principal DOE programs, and the establishment of quality assurance guidelines for major projects and systems acquisitions within the Department.

- The analyses of NEPA documentation requirements for proposed Departmental actions, and the development of NEPA compliance strategies for major programs such as nuclear waste disposal. The completion of 130 independent reviews of NEPA documents prepared by DOE organizational units. Major Environmental Impact Statement reviews include the Pantex Facility Expansion, the Northeast Regional coal conversion activities, the Purex facility restart, and a number of Uranium Mill Tailings remedial action projects. The practical result of this work is to insure that NEPA requirements are met, thereby protecting the Department's projects from delay and unnecessary cost due to non-compliance with the National Environmental Policy Act.

- The analysis of energy-related costs and benefits of proposed changes to the Clean Air Act and Clean Water Act and assessment of the impacts on DOE facilities of proposed modifications to these Acts.

- The assistance, by virtue of ES&H policies and independent overview, to the Department in continuing its excellent record of safety, health protection, and evironmental compliance at the Departmental operational facilities. For example, the latest Annual Report on Environment, Safety and Health at DOE facilities issued in October 1982 shows:

  -- That with minor exceptions the concentrations of routine radioactive releases from the departmental facilities continue to be undistinguishable from the natural background levels and that unusual occurrences consisted of only minor releases of radioactivity.

  -- Despite the large scale of the Department's activities, the safety record continues to be substantially better than that of private industry with respect to fatality and illness incidence rates, lost workday cases, and property and motor vehicle loss. For example, based on the U.S. industrial companies' average rate of 13 fatalities per 100,000 employees, DOE could expect as many as 19-20 deaths annually. However, in FY 1982, DOE experienced one-third that number, or six fatalities. Of these six, five occurred in transportation accidents and one from a fall during facility construction - DOE experienced no fatalities in FY 1982 involving the actual onsite operation of its facilities.

EMPHASIS IN FY 1984

Increased attention in FY 1984 will be placed on safety in DOE operational activities, including update of DOE policies for safety of DOE's nuclear operations, independent appraisals of field operations to verify implementation of those policies, strengthening emergency response and radiation protection capability, development of improved policies and technical assistance for handling toxic wastes, and improvements in aviation

safety and industrial hygiene. A slight reduction is made in the budget for quality assurance because of a reduced need for contractor support and the expected completion of developing the Unusual Occurence Reporting System. In addition, the transfer to the Assistant Secretary of Nuclear Energy (NE) of radiological surveys and certification of uranium mill tailings sites and former MED/AEC/DOE surplus sites reduces the operational safety budget; however, the ES&H program will retain oversight responsibility. The table below summarizes the budget request.

Funding Summary
(Budget Authority in Millions)

Environment Safety and Health	FY 1983 Request	FY 1984 Request
Operating Expense:		
Nuclear Safety	$10.1	$13.5
Quality Assurance and Standards	1.7	0.9
Operational Safety	16.5	14.8
Environmental Compliance	1.5	1.6
Environmental Analysis	2.0	2.6
Program Direction	5.4	5.4
Subtotal	37.2	38.8
Construction	3.0	0
Capital Equipment	1.5	1.6
Total ES&H	$41.7	$40.4
Staffing - Full-time equivalent	111	95

FY 1984 AND LONG-RANGE OBJECTIVES

In FY 1984 and future years the Program plans to continue the overview and assessment efforts of departmental activities to assure management that environment, safety and health policies are fully implemented and practiced in DOE's operational activities. The principal objectives in FY 1984 include:

- Develop training guidance for reactor and nuclear facility operators to improve operational safety at DOE nuclear facilities.
- Maintain a viable radiological emergency response capability for DOE facilities.
- Develop improved methods for internal radiation dose assessments, to assure compliance with radiation exposure limits recommended by national and international authorities.
- Develop improved methodologies for assessing the safety of nuclear operations.
- Issue revised environmental protection, safety and health protection guidance and conduct appraisals of ES&H performance at four of the eight Operations Offices in accordance with the biennial schedule.

- Issue quality assurance and unusual occurrence reporting guidance and appraise implementation of the guidance at eight field or program offices.

- Assist DOE organizational units in preparing sound NEPA documents for their actions, and perform reviews of all such required documents, so as to facilitate Departmental programs.

- Analyze proposed regulations and statutes, such as modifications to the Clean Air and Clean Water Acts, to ascertain the potential impact on DOE programs or interests.

SUMMARY

The Environment, Safety and Health Program to date has assured that national energy policies and departmental plans, programs and operations have effectively addressed and expeditiously resolved environmental and safety problems; and the proposed FY 1984 budget request provides the resources to continue the independent overview of Departmental operations and activities by the Environment, Safety and Health Program.

I am prepared to answer your questions or comments on this program.

Mr. SCHEUER. Your purview is just the people who work in DOE?

Mr. DAVIES. The responsibility which is covered by the program which I head is related primarily to the contractor operated DOE facilities, the national laboratories and so forth. One small part of this responsibility, however, does look outward, in that we have responsibilities to examine relationships between energy and the environment. That's the only part that really looks outward.

Mr. SCHEUER. But that's a big part?

Mr. DAVIES. Yes.

Mr. SCHEUER. Were you here at the beginning of the hearing?

Mr. DAVIES. Oh, yes, sir.

Mr. SCHEUER. You heard the feelings I expressed about what is a real national priority of our freeing ourselves from dependence on a bunch of tuppenny-ha'penny Arab oil sheiks in the Persian Gulf. We can do this by using this fantastic resource that we have under our ground, 500 years of coal. The Japanese have no such luxury. They're importing coal from the United States and burying it there so that they have some coal, too.

We already have 500 years, we don't have to import it from anybody. It's a fabulous asset, yet there are those of us up here who are scared stiff at moving ahead adding to that smokestack problem in the Ohio River Valley—the Middlewest. How do we use that resource? Let's get right into your bailiwick. How do we use that coal under the ground to vastly reduce our dependence on Persian Gulf oil, in a way that is not environmentally degrading or degrading to our health. That's your responsibility, that's clearly in your bailiwick, and if you can answer that question you've really done something for your country.

Mr. DAVIES. Mr. Chairman, do you have my resume in front of you?

Mr. SCHEUER. No; I don't.

Mr. DAVIES. If you did, you would see it, I have 31 years of experience with the Baltimore Gas & Electric Co. In that capacity was personally responsible for construction of projects involving the

burning of oil, coal, gas, and nuclear. I have been addressing the questions you ask now all my life. In my present job the closest point I can reach in the discussion you've just had, is that I do presently sit on the Interagency Committee on Transboundary Pollution. This is the Federal agency group that does talk to the Canadians, and I have been meeting with them and am quite familiar with the difficulties——

Mr. SCHEUER. You might be talking with them but you are not communicating with them. There is a vast gulf.

Mr. DAVIES. I understand the whole subject.

Mr. SCHEUER. They are absolutely outraged. They feel that they had a commitment from President Reagan when he came up there to meet their new Premier. It was the first chief of state that President Reagan met after he took the oath of office. They think they got a handshake and a commitment that our environment laws were going to be implemented, that research was going to be expedited in the problems of the Great Lakes and so forth. They feel that the administration has been backtracking on every commitment, including signed treaties that we have made with them. We don't have to get into the specifics of that.

If this is your bailiwick, tell us about what you are going to do about acid rain. Tell us about whether you think we can set standards now. Tell us about whether you think we have to know everything before we can do anything.

Mr. DAVIES. I can speak to that and give you some personal opinions. Again, this is not in my direct line of responsibility in my present job.

I believe the approach of the administration has been responsible in the acid rain area. The research figures have been going up. There's an awful lot of work that's been done in the joint committees between the United States and Canada in trying to reach agreements on the research information that both sides agree to. In the areas that we do not agree we have stated we do not agree. There is a series of books or reports that are coming out right about now, they are currently in peer review, and will be published and officially put on the record.

The United States is asking for more recent research and development because we honestly don't think we know enough to implement a regulatory process to abate the problem. The Canadians are taking a group force approach. They are saying let's each agree to reduce our emissions by 50 percent. We're saying if we do this we are not really positive, we have no real assurance, that this will create an effect which is warranted by the cost-related to the cost.

I think in a year or so when the results are really becoming evident, and we have a better handle on cause and effect, that we can begin to decide what abatement strategies can be followed.

For instance, there's no assurance that smoke going up from one stack does cause trouble at any one particular spot. We cannot track it, but there are tracer studies being developed and implemented now where we will begin to see this—get this information. When the information does arrive then we can make some conclusions related to those research studies, I think we would then know what we have to do.

There's a tremendous fear that by spending billions and billions of dollars to reduce sulfur emissions, might not result in a benefit.

We have to know more. What is the upper atmospheric chemistry involved? What is the contribution of the nitric acids from the automobiles and so forth? There is no question in my mind this is one of the most serious issues facing the United States, and we do have to find a solution. The issues in Europe are similar to the ones we have here and we have to find the answer to it.

Mr. SCHEUER. And the Swedes, the Finns, the Danes, and the Norwegians are just as outraged at England and France, Germany, Holland, Belgium for throwing their laundry over the fence as the Canadians are at us for dumping our laundry over the fence.

Mr. DAVIES. The Swedish people have gone to some programs of liming the lakes as an interim measure to try to correct some of the problems. That's possibly something we could do in this country.

Mr. SCHEUER. Well, the Canadians are thinking that, too.

Mr. DAVIES. Washing coal.

Mr. SCHEUER. We've done some of that in the Adirondack's.

Mr. DAVIES. Yes, sir.

Mr. SCHEUER. Do you think we know enough now to do anything? Maybe not tens or hundreds of billions of dollars worth of expense, but do we know enough to regulate acid rain—the smokestack industries even minimumly?

Mr. DAVIES. We have.

Mr. SCHEUER. Take the first most obvious and most cost- effective measures?

Mr. DAVIES. No. There have been reductions in sulfur emissions in various regions in this country, as a result of the Clean Air Act.

I keep asking people what affect has that had on lakes? Some information just recently coming available, and I only know this by hearsay, the U.S. Coast and Geodetic Survey has some new information in the Adirondack area which we're very anxious to look at. It's a summary of 25 years of information. We would like to think that this new data can be correlated with actual sulfur emissions in the Midwest. This might give us some information.

There's information coming available all the time. There's a lot of work that is being done which should be paying fruit within some years.

Mr. SCHEUER. How long from now do you think it's going to before the research data—let me ask a different question.

The Tobacco Institute still says, after all these years, that there's no one-to-one causal relationship between smoking three packs a day of cigarettes and getting cancer of the lungs; right?

Mr. DAVIES. I'm aware of that.

Mr. SCHEUER. Would you advise your wife or kids that it's harmless for them to smoke three packs of cigarettes a day?

Mr. DAVIES. No, sir.

Mr. SCHEUER. You would use a rule of judgment; right?

Mr. DAVIES. I stopped smoking in 1961, and my children don't smoke.

Mr. SCHEUER. And just the fact that there wasn't perfect linearity wouldn't stop you from advising the wife and kids to go easy on the noxious weed. That's a rule of reason.

Mr. DAVIES. I agree.

Mr. SCHEUER. Isn't it possible that we could apply that same rule of reason to this whole area of acid rain? You in effect have said, I am not going to wait until the American Tobacco Institute is satisfied that there's a one-to-one linear relationship—100 percent cause and effect between smoking and cancer—before I tell my kids that smoking is a no-no. It's a downer.

Why can't our American society say, as you have said, what happens when sulfur dioxide particles go up in the air is one of the most complicated and scientific phenomenon that we've ever seen. What happens in the course of transport, the changes that take place, the direction that it goes, the time in which it falls, the form in which it falls is so incredibly complicated we still not only don't fully understand it, we hardly understand it at all. Do we have to wait—now remember you gave up smoking—do we have to wait until we know all about that transport? You said we can't trace where the emissions go from that one smokestack. Do we have to wait until we can trace every last particle from that smokestack to wherever it goes before we can say as a matter of common horsesense, the same horsesense you used when you stopped smoking, that golly, the Middle West has 17 plants that are blowing this stuff up in the air. The sky is black with that smoke 1,000 miles away. The lakes seem to be dying. Forest seem to be degraded. Crops and grasslands are degraded. Maybe we don't have 100 percent causality, but just as common, ordinary, sensible human beings who make judgments every day about their lives, their businesses, their marriages, on the basis of imperfect evidence, maybe we can hazard the valued judgment that we ought to reduce some of that stuff in the Ohio River Valley. In some very rough human way we adopt the assumption that what goes up has to come down, and it's got to go down someplace. It probably doesn't all come down in the middle of the Atlantic Ocean. It comes down on land and maybe we ought to do something about it.

Mr. DAVIES. I don't argue with your general philosophy and analysis of the situation. The point is we are doing something about sulfur emissions. The present Clean Air Acts are reducing the amount of sulfur. With the slowdown in business economy recently, the amount of sulfur has reduced.

Mr. SCHEUER. Excuse me. I'm going to turn the chair over to Congressman Tom Lewis of Florida, my distinguished colleague who did such a magnificent job of Chairing a committee in Florida only a week or two ago.

I have to go and vote, I'll be back as soon as I can.

Mr. LEWIS. Thank you, Mr. Chairman.

Please continue, Mr. Davies.

Mr. DAVIES. I had finished.

Mr. LEWIS. You're finished?

Mr. DAVIES. At least in the discussion of acid rain.

Mr. LEWIS. All right. I have a couple of questions I would like to ask you.

On page 21 of your budget request, in the summary of changes, you have a reduction of $3 million, which is the transfer of radiological surveys and certification of uranium mills tailings, former MED/ACE and DOE surplus sites.

Mr. DAVIES. Yes, sir.

Mr. LEWIS. Could you explain this change and where the programs being transferred to?

Mr. DAVIES. Yes, sir. The programs are being transferred to the Office of Nuclear Energy, under Mr. Shelby Brewer in the Department of Energy.

The transfer was made because the function was split. Because of the inefficiencies in that split, the decision was made to combine them under Nuclear Energy and to make them more efficient. The Office of Nuclear Energy had the responsibility to physically stabilize and remove the tailings. Our office had the responsibility to do the site surveys. To designate which ones would be cleaned up and then we would certify after the cleanup that it was acceptable. This created some scheduling difficulties and problems. Also the fact that my office has primary oversight responsibilities within the Department, we decided that this was more of a line responsibility and it would be better handled in the Office of Nuclear Energy. This amount of money, which is the difference between last year and this year, reflects that transfer.

The Nuclear Energy Office made a corresponding adjustment in their own budget.

Mr. LEWIS. That's interesting. They will be picking up the $3 million.

Mr. DAVIES. Yes, sir.

Mr. LEWIS. Putting the activity where it belongs, so to speak.

Mr. DAVIES. Yes, sir. That's a good point.

Mr. LEWIS. What do you do to develop standards and assure the safety of nuclear powerplant operations?

Mr. DAVIES. The major thrust in our nuclear program has grown out of the experience at the Three Mile Island plant.

The regulation of the Department of Energy's reactors—we're talking just about the reactors within the Department of Energy—has always been internal regulation. However, at the Three Mile Island plant there were numerous lessons learned. Our major effort is to take those lessons and apply them to the operation of the Department's reactors themselves. If you remember, in that incident one of the major problems that was identified was the fact that the operators were not properly trained. So one of our initiatives has been to increase the training of fundamentals among DOE's reactor operators, and getting better training programs throughout the Department.

Another issue in the *Three Mile Island* case was something called human engineering, in other words, the panel boards didn't make sense to the operator. This has introduced a whole new concept of human engineering. We're factoring that into our effort to look at our own control rooms, to see if there are changes that should be made to make them more compatible to the human being that has to operate the particular reactor.

Mr. LEWIS. Did you find at other powerplants this human engineering factor cranked in or was this just common throughout the industry or was it just particular to Three Mile Island?

Mr. DAVIES. I think within the commercial industry, I mentioned I had years with Baltimore Gas & Electric Co., but this varied according to the company and according to the designer of the con-

trol room. In the particular case I'm familiar with, our operating people helped us design those control boards that are in the control room at this plant. I think if one would compare that particular control room with the Three Mile Island control room, you would find great differences between them.

Mr. LEWIS. This is now a policy through your Department that——

Mr. DAVIES. Yes, within the Department.

Mr. LEWIS [continuing]. The human engineer factor is designed into all control boards.

Mr. DAVIES. We're reviewing the ones that are currently in operation and if there were to be a new facility, then this theory or concept would be factored into the new plant.

Mr. LEWIS. With what you've learned from the Three Mile Island incident, as far as nuclear safety, I've noticed you now have a $625,000 reduction in the area of nuclear safety. Can you explain that?

Mr. DAVIES. We are not reducing our nuclear safety. That is on a growth pattern.

Mr. LEWIS. I'll refer the right page to you in a minute. I'll go on to another question.

What is happening to the radiological survey and certification program?

Mr. DAVIES. This program is primarily wrapped up in that remedial-action-type work. The radiation survey work is in that category. Separate from this is a program which we are continuing, which we call our aerial measurement system, and the whole tremendous background of talent and equipment which can answer radiological emergencies, as they might arise—for example, just recently when a freight plane crashed in the Detroit airport, there was a lot of play in the newspaper about a radioactive package in that particular instance. The people at the airport called the DOE's operation office in Chicago and a radiological assistance team went immediately to the airport and determined that the package was intact and safe. There was no problem. These people are on call around the United States right now, at any instant.

If there was, for instance, a radiation release at any of the Department's facilities or any commercial facility, the same team would move into action immediately. They would measure radiation from the air and from the ground, and provide Federal support for any emergency of that type.

Mr. LEWIS. Do you have these survey teams located throughout the United States that can be called on on a moments notice?

Mr. DAVIES. Yes; these are people who have regular jobs in the Government laboratories, who respond to the call. They have equipment and are ready to go. They drop what they are doing and move out immediately.

Mr. LEWIS. Is there any registration of vehicles carrying this type of material? Do you all have to be advised of them carrying radioactive material of any size? Is there a certain limitation placed on it or can they load up a truck and——

Mr. DAVIES. The Department is not involved in the transport of radioactive material from the commercial industry. If there was an

accident with one of these facilities our people would come immediately.

Mr. LEWIS. That's not what I'm speaking of.

Let's say a vehicle is going to move across the country—across one of the interstates. Do they advise you that they are going to move this material from one point to another and their route?

Mr. DAVIES. Not commercially. If this is a movement of materials under the auspices of the Department of Energy—there is quite a process if materials are moved under the auspices of the Department of Energy.

Mr. LEWIS. I guess what I'm driving at is this: A new plant is going to refuel, but they have several tons of unspent fuel that they have to move to a site. Are you made aware of this? Or do they just get a commercial truck to move it and it takes off across an interstate. You don't know it turned over until somebody calls you?

Mr. DAVIES. The process of that move would probably come under the Nuclear Regulatory Commission and the other transportation agencies. We're really not in that loop.

Mr. LEWIS. Not your Department at all?

Mr. DAVIES. No. But if there is an accident, then we would respond. We would get the call and we could respond to that accident. The normal shipping and transfer of this type of material is not——

Mr. LEWIS. Then you're not even on alert that they are on their way if there would be an accident?

Mr. DAVIES. I don't believe so.

Mr. LEWIS. That's very interesting.

Mr. DAVIES. The shipping containers are licensed by the Nuclear Regulatory Commission.

Mr. LEWIS. Yes, but the NRC doesn't respond to the accident; do they?

Mr. DAVIES. Well, they would probably be there, too.

Mr. LEWIS. But don't you have to survey the accident and make a determination whether it's safe to move this equipment or what have you?

Mr. DAVIES. Our people would be very much involved.

Mr. LEWIS. Who is responsible for that? The NRC doesn't have the people to do that, you have the people to do that; correct?

Mr. DAVIES. Well, if there's an accident we would respond.

Mr. LEWIS. If there's an accident.

Mr. DAVIES. If there's a release of activity we could respond.

Mr. LEWIS. I guess I better ask somebody in NRC that question, because I'm not getting any answer from you.

Mr. DAVIES. Well, I don't have an answer.

Mr. LEWIS. You just tell me you respond, and that's fine, but you don't know that it's being transported or anything else until you're called, when there is an accident. Then you respond. You don't know to what degree—I guess what bothers me about this is if you have to respond to this accident, and you don't know what the size of this radiological material could be, or what it's potency is, or anything else, but you respond to the accident. It just seems to me that somebody should know that it's being transported somewhere.

Mr. DAVIES. I'm sure it's well known. In other words, the State's probably informed in this matter.

Mr. LEWIS. But if you respond to it, don't you have any criteria as to how you would respond to it?

Mr. DAVIES. I'm sure they do, sir.

Mr. LEWIS. Let's say the fire department—they look at the symbol on the side of the truck and they know whether it's 100 octane gasoline, 80 octane gasoline or what. They know how to handle the situation. Now, how do you handle the situation if you have an accident and you don't know this until you get on the scene.

Mr. DAVIES. I would suppose that the people who called and asked us to respond would know quite a bit about the material involved and the type of packaging involved. They have to know that as the shipment takes place.

Mr. LEWIS. I hope we have a better control over this than we're discussing. With the dialog we have going back and forth I'm concerned, right now.

What is the purpose of the $400,000 reduction in the Marshall Islands and the related DOE sites?

Mr. DAVIES. I don't believe that's really anything too specific in nature. It's just almost a rounding out. I don't have any good information on this——

Mr. LEWIS. $400,000 is a pretty big circle. You don't feel that's——

Mr. DAVIES. No, I just honestly, sir, don't know what specifically the difference is between that—the $6 million and the $6,400,000. I'd have to get that answer for you.

Mr. LEWIS. OK. I appreciate your honesty on that.

Thank you. Mr. Chairman, I have no more questions.

Mr. SCHEUER. Congressman MacKay of Florida.

Mr. MACKAY. Mr. Davies, this is a fairly dramatic reduction in budget between 1982 and 1984.

Mr. DAVIES. Yes, sir.

Mr. MACKAY. What is your long-term operating plan?

Mr. DAVIES. Before I get to that let me just mention that the reasons for the reduction for change and scope of our particular operation is one of the major reductions is involved in the completion of the work we have funded in the testing of liquid natural gas spills. Another part is the shifting of emphasis from the development of energy technologies to abate emerging—new emerging energy systems. We're not doing the work anymore. In the past, my office at one time funded programs to develop equipment, to abate potential pollution from those particular types of technologies. In the current posture of the Department of Energy, we're not developing those types of technologies anymore so we have moved out of that particular business. The major thrust away from 1982 is really a change in emphasis within the Department. Through this whole period of time there's been a constant increase in expenditures related to the operation of our nuclear facilities, a changing emphasis in some of these other matters, which we have discussed. The thrust into the future is that my particular office would concentrate more specifically on the establishment of standards, which would be applied in the operation of the Department, the training

or development of theory of how you keep facilities safe, and ultimately an independent overview in monitoring of the Department's operations to assure that they have indeed—that they are performing according to the standards which had been set. We are becoming more and more of the overview system.

Within the Department of Energy, my office of Environment, Safety, and Health is a rather small part of the overall structure of how environment, safety, and health activities take place. As an example, we look primarily at the offices for environment, safety, and health in the field offices—these are the operation offices of the Department of Energy. They in turn then go into the various laboratories and operating facilities and look at the contractors' operations as far as environment, safety, and health are concerned.

The perspective that we have is one of a management perspective of the operation within the Department to see that the Department is indeed doing what it should be doing.

Mr. MACKAY. Maybe I misunderstand the meaning of some of the words. You are saying basically that you are moving more to an overview, which would seem to me that that, if I read the words correctly, would mean that you are moving more toward an environmental analysis function? Review of documentation submitted to you by other?

Mr. DAVIES. No. The major thrust of our activity is to go into the field and watch the operation of the field offices as they do their oversight responsibility of the contractor.

Mr. MACKAY. You mean to say, you see yourself as an overview activity to make sure the other personnel in the Department of Energy are doing their job?

Mr. DAVIES. That's correct. In the field of environment, safety, and health. I would also add quality assurance to that.

Mr. MACKAY. Does the funding level decrease—do you see this leveling off or do you see yourself just sort of presiding over a program which is going to go away?

Mr. DAVIES. Oh, no. We are not going away. We are very essential to the Department's operation, and the funding levels have been increasing. There have been some adjustment in them, but the general trend is that we are increasing our activity, rather than decreasing it.

Mr. MACKAY. Maybe the timeframe on this material is not appropriate for me to see that.

I seem to see a 27-percent reduction.

Mr. DAVIES. There's a major reduction from 1982, which represented a change in scope of our activities. Starting in 1983 and going to 1984, there is an increasing trend.

If you pick a particular line item such as on page 20, a nuclear safety item, is a major increase. The item 2 on quality assurance is up and down. That is dependent upon the stage of developing that. The later request will show an increase on that particular item. The operational safety appears downward there, because we have transferred some of these functions out to other parts of the Department.

The environmental compliance and environmental analysis parts are holding their own. They are not changing too much, just minor ups and downs according to individual planning. The general

thrust would be to carry along pretty much at the level we are now, with increases that might come about by inflation.

Mr. MACKAY. I read the environmental analysis line as saying that your 1982 appropriation was $8,063,000.

Mr. DAVIES. Yes, sir.

Mr. MACKAY. Your 1983 appropriation was $2 million and——

Mr. DAVIES. We're now creeping back up.

Again the large difference between that $8 million and the $2 million was the elimination of the, what we call, environmental technology group. These were the people who were designing pollution abatement equipment for the new emerging energy technology. As the Department of Energy got out of that business, then we got out also.

Mr. MACKAY. All right. Then I'm not sure this is a fair statement, but as I read what your policy is from this document alone, not from your words, your policy is we're going to be ready in nuclear and on the rest when something happens, we'll start again. Is that the plan?

Mr. DAVIES. If one looks at the Department's industrial enterprise, you'll find that about 80 percent of it is nuclear related and that's why the thrust is in this direction. Within those nuclear facilities there are many toxic chemicals, for instance, which we are very much concerned about. We look at the toxic chemical as it may be injurious to the employee or to the public, if it gets out of the facility. We're not in there to develop codes and standards for application into the United States as a whole. My office would establish standards which should be complied with by the Department of Energy in its own facilities, and we are very much concerned about that. Within the operations safety item we have the monitoring of the Department's facilities for their compliance with the appropriate environmental codes and standards, as they have to meet these.

Your Occupational Safety and Health Act establishes certain standards for the protection of employees. We have to comply with all of those particular standards, too. That comes under this Occupation and Safety Act.

Mr. MACKAY. Thank you, Mr. Davies.

Mr. DAVIES. Yes, sir.

Mr. MACKAY. Thank you, Mr. Chairman.

Mr. LEWIS. Mr. Davies?

Mr. DAVIES. Yes, sir.

Mr. LEWIS. On page 31 of your budget document. That's the question I raised on the reduction of the $400,000, the Marshall Islands and related DOE sites. I raised the question primarily because I read recently where there some great concern out there on some of those atolls about the radiation—the dose is still high out there—and there are some concerns out there.

You are reducing your program here to some extent, why are you doing that?

Mr. DAVIES. Yes, sir.

Well, that $400,000 I just cannot answer.

I think it would be best if we furnished that information for the record.

[The information follows:]

MARSHALL ISLANDS REDUCTION

Mr. DAVIES. The reduction in funding of $400,000 in fiscal year 1984 for the Marshall Islands and Related Sites is due to the cutback in several technical projects performed by DOE laboratories to support the EP medical and radiological monitoring and dose assessment activities in fiscal year 1983, which will become the responsibility of Defense Programs in fiscal year 1984, as shown in the following table:

[In thousands]

	Fiscal year—	
	1983	1984
Marshall Island program:		
Medical followup	$1,143	[1] $1,143
Radiological monitoring and assessments	1,951	[1] 1,951
Logistics	1,051	[1] 1,056
Subtotal	4,145	[1] 4,150
Nevada offsite dose reassessment	1,400	[1] 1,400
Program and policy support studies	855	450
Total	6,400	6,000

[1] Being transferred to defense programs.

Mr. DAVIES. I might mention that the entire budget item related to the Marshall Islands and also our association with the radiation exposures of people in Nevada from the atmospheric testing, which we had had a very integral part of that, is being transferred also out of our responsibility to the Defense programs office. So this would not repeat itself next year.

The radiological survey and certification budget request of $2.5 million, as I mentioned earlier we had transferred the responsibility for that remedial action work—the cleaning up of the formerly utilized sites of the old Manhattan District. Our responsibility will be an oversight responsibility to assure the Department and the world that the cleanup is taking place properly. We are an independent agency which would follow the work of the Office of Nuclear Energy to make sure that they are doing the job that they are supposed to be doing. That's what this $2.5 million is.

Mr. LEWIS. I see.

Thank you, Mr. Davies.

Mr. SCHEUER. Mr. MacKay, any further questions?

Mr. MACKAY. No, Mr. Chairman.

Mr. SCHEUER. Mr. Davies, we thank you very much for taking the time to be with us today.

If there's no further questions the subcommittee will recess, subject to the call of the chairman.

[Whereupon, the subcommittee adjourned at 4:05 p.m., subject to the call of the Chair.]

APPENDIX

QUESTIONS AND ANSWERS

FOLLOWING THE

APRIL 19, 1983 HEARING

BEFORE THE

SUBCOMMITTEE ON NATURAL RESOURCES, AGRICULTURE RESEARCH AND ENVIRONMENT

COMMITTEE ON SCIENCE AND TECHNOLOGY

HOUSE OF REPRESENTATIVES

WITNESSES: DR. ALVIN W. TRIVELPIECE, DR. CHARLES W. EDINGTON

LONG-RANGE PROGRAM PLANS

Dr. Trivelpiece, we have seen the budget for the biological and environmental research program decrease from $212 million in 1982 to a request of only $170 million for FY 1984. However, we have not seen a long-range plan for the program that explains why these cuts are made.

What are the Department's long-range plans for the environmental research program?

The future role of the environment program is currently being reassessed within the Office of Energy Research. A multi-year research plan is being developed which will reflect current Administration R&D policy and identify goals and objectives for the program through 1990. This plan will also include the specific scientific issues to be addressed and the research activities that will be conducted to resolve the issues in question. The research plan will be completed by September 1, 1983, and serve as a basis for the program's 1985 budget request.

What will be the future role of the environment program in the Department's activities?

A long-range plan for the Biological and Environmental Research program is currently being developed. Nevertheless, earlier this year, Secretary Hodel, described for the Senate Committee on Energy and Natural Resources, the five critically important missions for the Federal Government in energy. One of these missions was "development of fundamental scientific and engineering knowledge which can be the basis for new energy developments or for the assessments of the health, safety, and environmental effects of energy developments."

Will the FY 1985 budget request cut the environmental research program?

The budgetary process for FY 1985 has just begun, and DOE decisions on support for specific programs and issues are not likely to be made until mid-summer. As I have already stated, however, it is not my intent to start the FY 1985 budget process by requesting a reduced budget. The requested budget will reflect a rational increase to ensure an optimum level of research support.

Since many of the research programs are long-term, doesn't the decrease in funding essentially eliminate these programs?

No, it does not eliminate these programs.
For example, in research which addresses synfuel-related health and environmental issues, a significant portion of the effort in recent years, involved relatively short-term studies for characterizing the chemical and biological properties of the different coal conversion and oil shale processes and operations. This phase of the investigation has been successfully completed and provides the data base for designing the longer-term, generic experiments needed to determine the potential risks to humans and their environment of an installed synfuels industry. Thus a budget reduction may reflect a completion of some individual projects but does not correspond to the termination of entire research programs.

NON-NUCLEAR ENVIRONMENTAL RESEARCH

The environmental research program in nuclear energy related issues appears to be very strong. However, most of the twenty percent budget cuts since 1982 have been in non-nuclear areas.

What has been the reduction in non-nuclear environmental research since 1982?

Support for nonnuclear-related biological and environmental research has decreased by approximately $25 million in the two year period, FY 1982-FY 1984.

Why have the non-nuclear environmental research programs been reduced more than the nuclear programs?

Much of the radiation effects research represents relatively large commitments in time and resources to determine the delayed effects in human populations and different experimental animal species exposed to acute and chronic low level radiation from external sources or internally deposited radionuclides. Although funding for these unique investigations has been reduced, they can not be terminated without irretrievable losses in important biological data and investments. Much of the research conducted in support of non-nuclear issues has been short-term in nature and has been completed. Funding has been redirected to address longer term problems posed by those chemical compounds identified in short-term investigations to be potentially hazardous to human populations and their environment.

Will the FY 1985 budget request also reduce non-nuclear environmental research? What are the future plans?

As I have already stated, Mr. Chairman, it is not my intent to request a reduced budget in FY 1985 for the Biological and Environmental Research

program. No decision has been made, however, on the absolute level of support for any part of that research program. We will continue to support the long-term, generic research which addresses health and environmental issues associated with both nuclear and nonnuclear energy technology developments.

HUMAN HEALTH PROGRAM

The Human Health Research Program has not decreased much since 1982, and in your testimony you indicate that most of the research is in nuclear energy related issues.

How much of the FY 1984 $24.4 million request is for nonnuclear human health research?

Approximately $4.0 million of the request is for non-nuclear human health research.

Are there non-nuclear human health issues that should be studied? If so, please indicate what they are?

Yes. More intensive investigations would be helpful in delineating human risks from exposure to increased levels of indoor air pollutants following enhanced home weatherization; silica, silicon and other materials of solar technology development; and to the various materials generated during various stages of the energy-cycle of coal and oil shale conversion.

For appropriate study of these issues, two preliminary tasks are required: feasibility studies to identify suitable populations for investigation; and identification of biochemical, metabolic, or physiological endpoints to increase the sensitivity of epidemiologic analyses which rely now on overt morbidity and mortality.

One of the proposed budget cuts is in cancer studies. Please explain the research program and what studies have been eliminated?

All radiation epidemiology studies have cancer as a major endpoint. The proposed budget anticipates reductions in some of these programs.

HEALTH EFFECTS RESEARCH

The health effects research program has been reduced by twenty-three percent since 1982.

What programs have been eliminated?

Research in two program areas has been eliminated. They are research to define biological effects of 60-Hertz electromagnetic fields; and coordinated interlaboratory research utilizing short-term cell bioassays to gain general perspective on potential health impacts associated with synfuel production from fossil energy resources.

Is the research that was cut being conducted elsewhere? Or is not being done?

Research on bioeffects of electromagnetic fields is being conducted elsewhere under the sponsorship of several different organizations. An important source of continuing support derives from DOE's Office of Conservation and Renewable Energy which has sponsored research in this area for a number of years. Through the Electric Power Research Institute and to a lesser extent through individual utilities, the electric power industry is also sponsoring a significant research effort. In addition, the State of New York has recently initiated a modest program of biological research using funds collected from utilities operating in the state.

The coordinated interlaboratory research effort was conducted specifically to acquire, in a minimum of time, general information on the kinds and quantities of toxic chemicals that are present in materials associated with synfuel production. By combining short-term cell testing with chemical characterization, we have gained sufficient information to initiate a long-range, generic program to study the toxicology, carcinogenicity,

and mutagenicity of complex hydrocarbon mixtures. Under other sponsorship, short-term cell testing continues to be used in biological work related to synfuel production, but primarily for monitoring of exposure environments.

Is non-nuclear energy research being conducted in this program? Should not the health effects program conduct research in fossil energy related technologies?

Yes, the health effects research program includes research that addresses health questions related to the utilization of fossil and renewable energy resources, including selected conservation options. Given the future importance of synthetic fuels, it is necessary that this program continue to address synfuel-related issues. At the present time research is focused on broad, generic issues with particular emphasis on studies to evaluate and understand the biological effects produced by exposure to complex chemical mixtures.

ENVIRONMENTAL RESEARCH

The Environmental Research Program has been reduced by twenty-three percent since 1982.

What research programs have been eliminated or cut back since 1982?

Environmental research programs have been terminated in the following areas: freshwater and marine research on the cycling and effects of nuclear and nonnuclear related by-products that are of lesser concern to humans and the environment and specific high level radioactive waste studies in support of the Sea Bed Disposal Program; and land reclamation studies that were short-term and specific for individual fossil fuel technologies and more appropriately done by the private sector. Reductions have been made in short-term, technology specific environmental research in the fossil fuel areas.

Have nonnuclear programs been cut as much as nuclear programs? Please explain.

Yes. Terminations of environmental research in solar and conservation areas have been made while major reductions have been made in fossil fuel oriented research.

Have studies in toxic metal research been cut? If so, why?

Yes, reductions in toxic metal environmental research have been made. During this period, however, research emphasis has shifted from determining simple concentrations of metals or organic compounds in organisms to the identification of cellular and intracellular sites that are directly affected by metal exposure to these chemicals. This information better explains why organisms respond to a given stress and leads to an understanding of the tolerance and adaptation the organisms can make to reduce

the impacts of such additions to their environment.

Are there research programs in nonnuclear environmental areas that are not being conducted elsewhere that should be conducted by DOE? If so, please explain.

Yes, there are several nonnuclear environmental areas where research could be expanded under lesser budgetary constraints. They include: research on the long-term subsurface transport and effects of energy by-products that are stored or disposed of in burial sites; the determination of the mechanisms by which various energy-related contaminants react and are attracted to soil colloids; fundamental physiological ecology studies on the effects of chemicals on biochemical responses and detoxification mechanisms of plants and animals both at the cellular and molecular levels; and manipulation experiments on integrated watershed-lake ecosystems in which the long-term effects of acidification and neutralization on fundamental ecological responses are evaluated.

PHYSICAL AND TECHNOLOGICAL RESEARCH

This program, which is concerned with developing new equipment for monitoring and detecting various chemicals in the environment, has been reduced twenty-eight percent since 1982.

One area in this program is acid rain; has this been cut? What is the level of effort for acid rain?

Support for acid rain research has not been reduced in the FY 1984 budget submission. This research will be funded at a level of $1.8M in the Biological and Environmental Research program.

Has research in non-nuclear areas, such as the detection of toxic chemicals, been reduced? If so, please explain why:

Research in nonnuclear areas will be reduced largely due to the completion of several short-term characterization studies of selected coal conversion and oil shale retorting processes. In addition, it is anticipated that several instrumentation development projects related to detection of toxic chemicals will be completed.

RISK ASSESSMENT

Why has the program in health and environmental risk analysis been terminated?

The Health and Environmental Risk Analysis Program does not produce new research information, so the decision was made to terminate the program in both the FY 83 and FY 84 budgets. As a result of the guidelines accompanying appropriations for DOE's Biological and Environmental Research program in the Continuing Resolution for FY 83, this program is operating at a level of $1.75 million in FY 83.

Is this type of research conducted anywhere else?

Environmental risk analysis is extensively and increasingly conducted by many federal agencies to support their decision processes. There is a relatively small program of risk analysis and supporting research activities conducted by the EPA on synthetic fuels.

NUCLEAR MEDICINE

This program, which contains studies on cancer, mental-illness, and heart disease, has not had an increase in funding over last year.

What are the Department's long-term plans for this program?

This program has, in fact, shown an increase of $2.5M from the FY 83 level of $18.5M to a level of $21.0M in FY 84.

The program will continue to support exploratory research to develop new medically useful isotopes, pharmaceuticals and instrumentation and demonstrate their clinical feasibility. We also intend to initiate research on the application of nuclear magnetic resonance, development of new isotope generators, and medical applications of radiation from synchrotron light sources.

Is this type of research conducted anywhere else in the Federal Government?

No. The National Institues of Health supports studies of specific diseases using already established nuclear medicine procedures. The DOE program utilizes unique facilities and capabilities to produce new medically useful nuclides; to synthesize better labeled agents for imaging, for organ function studies and for therapy; and to demonstrate the clinical feasibility of new medical applications of nuclear technology.

Long-Term Program Plans

QUESTION: The Budget for Environment, Safety and Health has decreased from $55 million in 1982 to a FY 1984 request of only $40 million.

A. What are the long-term plans for this program? Will the FY 1985 request also cut this program?

B. What will be the future role of this program in the Department's activities?

ANSWER: The long-term plans and future role for the Environment, Safety and Health program are to continue to overview and assess efforts of departmental activities to assure management that environment, safety and health policies are fully implemented and practiced in DOE's operational activities.

Non-Nuclear Activities

QUESTION: The nuclear energy activities of the Environment, Safety and Health program appear to be adequate. However, the program also includes non-nuclear activities.

A. What has been the funding reduction in non-nuclear activities since 1982?

B. What non-nuclear activities have been decreased since 1982? What is the justification for elimination of the activities?

ANSWER: The non-nuclear activities in FY 82 involved the analysis of environmental controls for fossil plants and the assessment of regional impacts of fossil plant siting and totaled about $6.5 million; this activity has been terminated in accordance with the Administration's policy on government versus industry responsibilities for development of energy systems. In addition, the safety testing of liquified natural gas (LNG) was terminated in FY 82 based on the Administration's policy that industry was responsible for such safety testing; costs for LNG safety testing in FY 82 were $4.7 million.

National Environmental Policy Act (NEPA) Activities

QUESTION: In the budget justification for this program there is a statement that in 1981 DOE streamlined its NEPA procedures which lead to more efficient evaluation of the documents. The program, Environmental Compliance, has had a forty-seven percent funding decrease since 1982.

A. How can 130 or more NEPA documents be adequately reviewed annually by your staff at roughly half the funding level?

B. What is the quality of the final evaluation? Is this a rubber stamp procedure?

ANSWER: A. In addition to its NEPA review function, the program is also responsible for developing generic guidance on other environmental compliance requirements applicable to proposed projects. The funding decrease since 1982 does not affect the NEPA review function but is related only to generic guidance, and reflects reduced needs resulting from the completion of several guidance documents which required a substantial portion of the Fiscal Year 1982 funding. Although there is a need to keep the documents updated, the cost of updating is small compared to the cost of developing the documents and is included in the current funding request.

B. The environmental compliance program works closely with Department offices at various steps in the NEPA document preparation process. This effort involves providing early advice on the level of NEPA documentation, assistance and guidance in preparing NEPA documents, and independent review and comment on preliminary versions of NEPA documents. As a result of these efforts, substantial improvements are made to the NEPA documents during preparation and the program's final evaluation of the documents can be expedited without compromising quality and becoming perfunctory.

Liquified Natural Gas Spill Hazards

QUESTION: The 1983 DOE appropriations bill mandated that the Environment, Safety and Health program established a program to study how to handle large spills of liquified natural gas.

A. Earlier indications were that your office would not conduct the mandated studies. What is the current status of the liquified natural gas spills program?

B. What are your long-range plans for this program?

ANSWER: As noted above, the department closed out the liquified natural gas safety testing program in FY 1982 and made the data available to industry. However, in the FY 83 appropriation and continuing resolution legislation, the Congress provided $3.0 million for the construction of a Liquified Gaseous Fuels (LGF) Spill Test Facility to be built by the government for use by industry on a cost-reimbursement basis. The Department is currently conducting siting studies and preparing cost estimates and construction schedules for the LGF Spill Test Facility. A report on the project is to be submitted to the Appropriations subcommittees this summer.

○